

Biography: Maria Sklodowska-Curie

Maria (Marie *Fr.*) Sklodowska-Curie (born in Warsaw, Poland, in 1867) was one of the first woman scientists to win worldwide fame, and one of the great scientists of this century. She had degrees in mathematics and physics. Winner of two Nobel Prizes, for Physics in 1903 and for Chemistry in 1911, she performed pioneering studies with discovered by her polonium and radium and contributed profoundly to the understanding of radioactivity.



Maria Skłodowska-Curie, was born in November 7, 1867 in Warsaw, as the fifth and youngest child of Bronisława Boguska, a pianist, singer, and teacher, and Władysław Skłodowski, a professor of mathematics and physics. When she was little and living in Poland, her nickname was Manya. From childhood she was remarkable for her prodigious memory, and at the age of 16 she won a gold medal on completion of her secondary education at the Russian lycée. Because her father, a teacher of mathematics and physics, lost his savings through bad investment, she had to take work as a teacher and, at the same time, took part clandestinely in the nationalist free university, reading in Polish to women workers. At the age of 18 she took a post as governess, where she suffered an unhappy love affair. From her earnings she was able to finance her sister Bronia's medical studies in Paris, on the understanding that Bronia would in turn later help her to get a further education in France.

So, in 1891, she went to Paris to continue her studies at the Sorbonne. She began to follow the lectures of Paul Appel, Gabriel Lippmann, and Edmond Bouty at that University. There she met physicists who were already well known- Jean Perrin, Charles Maurain, and Aimé Cotton. Skłodowska worked far into the night in her students' quarter garret and virtually lived on bread and butter and tea. She came first in the licence of physical sciences in 1893. She began to work in Lippmann's research laboratory and in 1894 was

placed second in the licence of mathematical sciences. It was in the spring of this year that she met Pierre Curie. In the following year they were married. Maria Skłodowska was daughter of a Polish freethinker, but reared by a Catholic mother. She abandoned the Church before she was 20 and her marriage with Pierre Curie was a purely civil ceremony because she says in her memoir of him, Pierre belonged to no religion and he did not practice any.

Just before she married Pierre, Maria had only one dress. She wore it every day. Thus, when her sister – Bronia's – mother in-law decided to buy her the wedding dress, Maria asked that it should be practical and dark, so that she could later wear it in the laboratory. A pair of brand-new bicycles, that Maria and Pierre received as a wedding gift was their only major possession at that time. They caused quite a stir when they decided to go on honeymoon by bike... It was not convenient way of transportation, especially for women wearing the long, heavy dresses, at this time.

The marriage of Maria and Pierre marked the start of a partnership that was soon to achieve results of world significance, in particular the discovery of polonium (so called by Maria in honour of Poland) in the summer of 1898, and that of radium a few months later. Following Henri Becquerel's discovery (1896) of a new phenomenon (which she later called "radioactivity"), Maria Curie, looking for a subject for a thesis, decided to find out if the property discovered in uranium was

to be found in other matter. She discovered that this was true for thorium at the same time as G.C. Schmidt did.

Turning to minerals, her attention was drawn to pitchblende, a mineral whose activity, superior to that of pure uranium, could only be explained by the pre-sence in the ore of small quantities of an unknown substance of very high activity. Pierre Curie then joined her in the work that she had undertaken to resolve this

problem and that led to the discovery of the new elements, polonium and radium. While Pierre Curie devoted himself chiefly to the physical study of the new radiations, Maria Curie struggled to obtain pure radium in the metallic state-achieved with the help of the chemist A. Debierne, one of Pierre Curie's pupils.

Pierre's lab was too small, so the headmaster of the Industrial School of Physics and Chemistry agreed to give him an old shed in the yard, a former dissection room. The roof was made from glass and on gloomy days it would leak, while on sunny days the inside was as hot as in a greenhouse. She told "Sometimes I spent the entire day mixing some boiling solution in a mixer which was almost as big as I was. In the evening I was so exhausted I immediately collapsed". This went on for four years, with breaks only for holidays. In 1902, after 45 months of alchemic work, processing more than a ton of waste material, Maria had one-tenth of a gram of pure radium salt. That was the first isolated portion of the substance in the world and it soon was worth much more than gold.

As the result of this research Maria Curie received her doctorate on science in June 1903 and, with Pierre, was awarded the Davy Medal of the Royal Society. Also in 1903 they shared with Becquerel the Nobel Prize in Physics for the discovery of radioactivity. The birth of her two daughters, Irene and Eve, in 1897 and 1904 did not interrupt Maria's intensive scientific work. She was appointed lecturer in physics at the École Normale

Supérieure for girls in Sévres (1900) and introduced there a method of teaching based on experimental demonstrations. In December 1904 she was appointed chief assistant in the laboratory directed by Pierre Curie.

The sudden death of Pierre Curie (April 19, 1906) was a bitter blow to Maria Curie. Pierre was killed in a street accident. Walking across the Rue Dauphine in heavy rain, he was struck by a horse-drawn vehicle and fell under its wheels, fracturing his skull. While it has been speculated that he may previously have been weakened by prolonged radiation exposure, it has not been proven that this was the cause of the accident. This tragic moment in Maria's life has been also a decisive turning point in her career: henceforth she was to devote all her energy to completing alone the scientific work that they (together with Pierre) had undertaken. On May 13, 1906, she was appointed to the professorship that had been left vacant on her husband's death; she was the first woman to teach at the Sorbonne. In 1908 she became titular professor, and in 1910 her fundamental treatise on radioactivity was published. In 1911 she was awarded the Nobel Prize for Chemistry, for the isolation of pure radium. In 1914 she saw the completion of the building of the laboratories of the Radium Institute (Institut du Radium) at the University of Paris.

Throughout World War I, Maria Curie, with the help of her daughter Irène, devoted herself to the development of the use of X-radiography. There was no use doing research as the lab had been closed (most of the staff were called up to the army). Maria spent most of her savings, mainly from the Nobel Prize, on war donations. She organises a frontline radiology service – she should place X-ray machines, films and reagents into almost 20 vehicles, equipped with the dynamo to generate the electric current. They were called by the army "les petites Curies" (the little Curies). She

could drive one of them herself as in 1916 got her driver's license.

In 1918 the Radium Institute, the staff of which Maria's daughter Irène had joined, began to operate in earnest, and it was to become and universal centre for nuclear physics and chemistry. Maria Curie, now at the highest point of her fame, and, from 1922, a member of the Academy of Medicine, devoted her researches to the study of the chemistry of radioactive substances and the medical applications of these substances.

In 1921, accompanied by her two daughters, Maria Curie made a triumphant journey to the United States, where President Warren G. Harding presented her with a gram of radium bought as the result of a collection among American women. She gave lectures, especially in Belgium, Brazil, Spain, and Czechoslovakia. She was made a member of the International Commission on Intellectual Co-operation by the Council of the League of Nations. In addition, she had the satisfaction of seeing the development of the Curie Foundation in Paris and the inauguration in 1932 in Warsaw of the Radium Institute, of which her sister Bronia became the director.

Maria Skłodowska-Curie visited Poland a last time in the spring of 1934. Only a couple of months later, she was dead. Her death on July 4, 1934, at the Sancellemoz Sanatorium in Passy, in Haute-Savoie, eastern France, was from aplastic anemia, almost certainly contracted from exposure to radiation. The damaging effects of ionizing radiation were then not yet known, and much of her work had been carried out in a shed without any safety measures. She had carried test tubes containing radioactive isotopes in her pocket and stored them in her desk drawer, remarking on the pretty blue-green light that the substances gave off in the dark. She was interred at the cemetery in Sceaux, alongside her husband Pierre. Sixty years later, in 1995, in honor of their achievements, the remains of both were transferred to the Paris

Panthéon. She became the first woman honored in such way.

Her laboratory is preserved at the Musée Curie.

"My mother was 37 years old when I was born.

When

I was big enough to know her, she was already an aging woman who had reached the summit of renown. And yet it is the 'celebrated scientist' who is strangest to me - probably because the idea that she was a 'celebrated scientist' did not occupy the mind of Marie Curie. It seems to me rather, that I have always lived near the poor student, haunted by dreams, who was Marie Skłodowska long before I came into the world."

Eve Curie, biographer of her mother

"Marie Curie is, of all celebrated beings, the one whom fame has not corrupted."

Albert Einstein "Madame Curie" by

Irene Curie, DaCapo Press 1937

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Prepared on the base of:

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<http://www.staff.amu.edu.pl/~zbow/ph/sci/msc.htm>

<http://www.squidoo.com/mariecurie>

For more detailed information look at:

"Book of walks in Marie Skłodowska - Curie's footsteps" by Piotr Cieśliński & Jerzy S. Majewski, Agora SA, Warsaw, 2011.

Biography: Maria Skłodowska-Curie was edited by Stephen Klassen and Cathrine Froese Klassen and is based, in part on **Historical Background: Atoms** written by Peter Heering.

Biography: Maria Skłodowska-Curie was written by Katarzyna Przegiętka with the support of the European Commission (project 518094-LLP-1-2011-1-GR-COMENIUS-CMP) and Polish Association of Science Teachers, Poland. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.