Rising to the Occasion

Marie Curie is best known for the discovery of the element *radium* and for the physical property of *radioactivity* – the fact that certain elements (uranium, radium and others) give off very high-energy rays. She and her husband Pierre instigated the first medical experiments on radiation therapy for cancer. However it is not so well known that Marie Curie (neé Skłodowska) almost never made it into the laboratory.

What got in the way? Politics, gender, and economics. The Russians ruled Warsaw when Marie Skłodowska was born in 1867. They aimed to obliterate the Polish nationality by prohibiting the study of Polish language and history. So much as speaking Polish in public risked arrest. Furthermore, Russia banned women from higher education. Study abroad in France, where women were permitted to attend university, required money that the Skłodowski family didn't have.

Time and again the young Maria Skłodowska could have settled for less, given in, or given up. Yet, not only did she refuse to be put off her goal, she excelled in spite of the obstacles.

In primary school she skipped a grade, and even so was often the student chosen to answer the government inspector's questions in Russian. She graduated *gymnasium* (high school) at the top of her class. Since her family had no money, she worked six years as a governess to put her sister through medical school in Paris before starting her own college career in 1891 just before her 24th birthday.

Along the way, she paved her path with positivism and perseverance: As a governess she studied physics in solitude. She courted arrest by running a secret, illegal school to teach peasant boys and girls to learn to read and write in their native language of Polish and by conducting chemistry experiments at a clandestine laboratory in Warsaw. Once in Paris she disregarded the fact that no other women were studying in her field. She ignored the prevalent French view expressed by Mirbeau at the time that "woman is not a brain, she is a sex."

It isn't as if she were impervious to the limitations surrounding her. The confining milieu took its toll. She once wrote to her brother, "I have lost the hope of ever becoming anybody."

But she pulled through, sometimes through the aid of her siblings (her sister helped support her when she first arrived in Paris), once with assistance from one of her Polish countrymen (a friend solicited for her the Alexandrovich Scholarship, which allowed her to continue her studies in France).

After two years at the University of Paris, she came in first in her class in Physics, in spite of the language barrier. Before long she met and married physicist Pierre Curie. Over the next eight years she: began to study strange rays that could pass through solid objects,; named these rays "radioactivity"; determined that radioactivity is an atomic property; hypothesized and (with Pierre) proved the existence of two new elements (polonium and radium); earned a doctorate in physics for her groundbreaking work in radioactivity; and bore two daughters.

Pierre rose to the occasion as well. In 1903 the Nobel committee offered him the Nobel Prize in physics for the discovery of radioactivity. He wrote back that it was his wife who first published this theory, before he joined her in the laboratory. Therefore he would accept the award only if Marie were named too.

Were Marie's troubles now over? Hardly. Marie and Pierre craved adequate laboratory space, self-funded their research with full time teaching positions, and scorned the growing fame.

Suddenly tragedy struck. In 1906 Pierre died in a wretched street accident. Marie came precious close to quitting. But she rose to the occasion again, becoming the first woman to lecture at the University of Paris (known as the Sorbonne) in its over 600-year history. That is, for the first time in over 600 years, men would be learning from a woman at university level in France. Soon she received a second Nobel Prize, this time in Chemistry.

Her path wasn't all rosy. She lost her bid to be elected to the French Academy of Sciences. (A woman would not be admitted for another half century.) And the cumulative effect of radiation exposure gradually ate away at her strength.

Throughout the acclaim and losses, she chose to live to her highest self. Pierre and Marie sacrificed a fortune by declining to patent their process of isolating radium that the world might benefit freely from radium's curative properties. Marie repaid the Alexandrovich scholarship, so that another student might be granted the opportunity to study. She willed the $70,000 gram of radium she was given not to her daughters, but to her laboratory.

As a companion legacy to her specific scientific achievements, she opened the doors of science to women worldwide. By 1931 a third of the researchers working in the Curie lab were women. Poland and France have the greatest percentage of women graduating in physics today. One of Marie's students, Marguerite Perey, discoverer of the element francium, became first woman admitted to the French Academy of Sciences in 1962. Inspired by Marie's tenacity, and by the intriguing world of radioactivity, thousands of both women and men have the chance and the challenge to rise to the occasion today.