6. Being Marie Curie: A Pioneer with Passion and Perseverance

"Life is not easy for any of us. But what of that? We must have perseverance and above all confidence in ourselves. We must believe that we are gifted forsomething and that this thing must be attained."

- Marie Curie-Sklodowska

How would it feel to BE Marie? "Manya" as the "Nesthäkchen" (youngest of five children) that she was back in 1870s Warsaw.

First, she wouldn't recognize her future "Marie Curie" self because she *wasn't* that person yet though the seeds were germinating within her. She *wouldn't* speak our language either unless we were Polish or Russian. At age seven, let's say, she might tell you with her dancing dark eyes—

Cześć! Nazywam się Manya Skłodowska. Mieszkam w Warszawie, która obecnie należy do Rosji. Ale nie na zawsze! … Dzisiaj — 7 listopada — są moje siódme urodziny, więc urządzimy małą imprezę — nic wielkiego, bo jesteśmy biedni — ale będziemy świętować z moimi rodzicami i czterema braćmi i siostrami, bo jestem najmłodszy… ale najbardziej uparty super-osiągacz!

The Sklodowski's children : from left to right Sophia, Helena, Maria, Joseph et Bronislawa, 1872. Source : Musée Curie ; coll. ACJC / Cote MC

Didn't quite catch that? Me neither. Let's translate:

Hello! My name is Manya Sklodowska. I live in Warsaw, which belongs to Russia just now. But not forever! Today—November 7th 1874—is my seventh birthday so we'll have a little party—no big deal because we're not rich—but we'll celebrate with my parents and four brothers and sisters because I'm the youngest … but the most curious detective of the mysteries of science!

Tough times. Those were *tough* times, especially for Polish patriots. Why? Because Poland didn't even ***exist*** geographically in 1867 when the later Marie Curie was born. From being the largest state in Europe, perhaps even the continent's most powerful nation in the mid-1500s, Poland altogether ceased to exist for 123 years—from 1795 to 1918.

During this time of partition, control over the former Poland was split between Prussia, the Austrian Habsburg monarchy and Russia. Warsaw came under the iron fist of
Russia; even the country's name was erased; from 1874 onwards it was called only
"Vistulaland." Just reading or writing in their native language bought about punishment. Thus, Manya's father lost his math and physics teaching job, as did other intellectuals who dared to come out in favor of Polish independence.

Not only politics. Poverty as well as ill-health plagued Manya's family. When she was only ten, her oldest sister, Sophia, contracted typhus and died of it. Barely two years later when she was just twelve, Manya's mother, the headmistress of a prestigious Warsaw boarding school for girls, died from tuberculosis. A dark time with seemingly little to hope for.

Her father struggled to sustain his four remaining children alone but couldn't offer his very bright youngest daughter—with an estimated 180–200 I.Q.–any hope of a higher education. After graduating high school, Manya had wanted to attend university, but that wasn't something that young women *did* in late 19th century non-Poland. The university was a "men's only" club.

Although they were a tight-knit family, still, Manya had to do it *herself*—with help from her older physician-in-*spé* sister, Bronislawa. She *did,* though she could not escape Russian-dominated Warsaw until she was in her mid-twenties. Meanwhile, Manya tutored, studied at the clandestine "Floating University"—its locale changed regularly to avoid detection by the Russians—and began practical scientific training in a laboratory run by her cousin Józef Boguski, who had been assistant in St. Petersburg to a renowned Russian chemist. Despite jobbing as a governess to help her sister (not to mention falling in love with the "wrong" man whose family found her not rich enough), she never lost sight of her lofty "pure scientific" goals. Neither money nor success were ever a part of those goals.
"Passion and unblemished devotion". At last, at age 24, Manya made to Paris in 1891. Sister Bronya helped her. Marie—who now changed her name to the French "Marie"—inscribed in Paris' famous Sorbonne, one of the few European universities that even *countenanced* women as students, and proceeded to read physics, chemistry and mathematics.

She was nevertheless dirt poor, allegedly subsisting on only 3 French francs a day during these years. She later revealed that *"it was monotonous, studying, working, researching—sometimes so cold in winter in my room that ice formed in the water pitcher"*—but she persevered and never gave up, for the sake of science and her indomitable drive to learn more each day.

She was *there,* at Paris' famed Sorbonne; she was *inspired,* and ***nothing*** could stop her now! A quote from those fascinating, science-obsessed years:

> "A scientist in the laboratory is more than just a mere technician: s/he is also like a child confronting natural phenomena that impress him/her as though they were fairy tales. "
>
> *Marie Curie (1925)*

Enter Pierre. Then, a totally unanticipated French "prince" crossed her path unbidden! In 1894 when she was 27, she met Pierre Curie, a 35-year-old French physicist who was studying crystals and magnetism. According to Smithsonian Magazine, Pierre was so taken by Marie's uncommon intellect and drive that he proposed marriage to her, writing *"It would be a beautiful thing, a thing I dare not hope, to pass through life together, hypnotized in our dreams: your dream for your country; our dream for humanity; our dream for science."* They married on 26 July 1895.

If you were Marie, wouldn't you be just slightly "over the moon"? She *was.*

But practical nonetheless, her 'wedding dress' was a dark blue frock, one that she could wear in the lab. A lab that was at the outset nothing but a dilapidated shed with broken windowpanes that let in the rain and snow. She paid no attention to *this!*

The Curies enjoyed a happy, affectionate marriage and were known for their devotion to one other.

Children? Mais bien sûr! The Curies had two daughters. Irène, the eldest, was born in 1897, two years after Pierre and Marie married, who later became a Nobel-Prize-winning scientist in her own right. Daughter Eve was born seven years later in 1904. *"I have frequently been asked … how I could reconcile family life with a scientific career. Well, it has not been easy."* But she DID it!

Sub-atomic particles. A daring hypothesis—that proved to be true! Building on Henri Becquerel's observations of the element uranium, scientists were nevertheless baffled by the source of uranium 's high-energy emissions. As Curie wrote in 1900, "the *source* of the energy remains undetectable." But then, Marie posited a theory that would have truly radical implications! A ***"shocking proposal … truly amazing … a bold statement*** *at that time because the atom was thought to be the most elementary particle, one that could not be divided. It further meant that atoms are not necessarily stable."*

Marie Curie's pioneering hypothesis revised the scientific understanding of matter at its most elemental level!

How would you feel NOW if you were Marie?
Perhaps just a little lightheaded with astonishment …
and more curious than ever!

This hypothetical substance—radium! Marie and Pierre continued their search. *"There must be some unknown substance, very active, in these minerals,"* she concluded. *"My husband agreed with me, and I urged that we search at once for this hypothetical substance, thinking that, with joint efforts, a result would be quickly obtained."*

In 1898, at the age of 31, she indeed identified one of the substances and named it *polonium*, after her Polish homeland. Five months later, she identified a second element, which the world came to know as *radium*. Curie described the elements she studied as "radioactive." They were really onto something phenomenal. But then, without warning, …

The BLACK out of the blue. Thursday, 19 April 1906 proved to be the darkest moment of Marie's entire life; partly because it came so unbidden "out of the blue". As we are told, *"Crossing Paris' busy Rue Dauphine in the rain at the Quai de Conti, Pierre slipped and fell under a heavy horse-drawn cart. One of the wheels ran over his head, fracturing his skull and killing him instantly."*

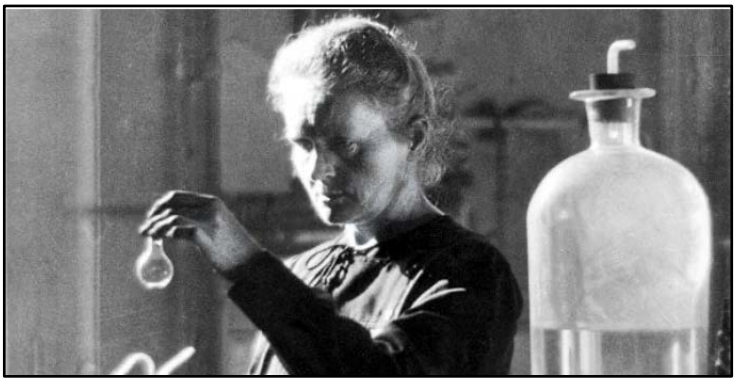
Marie was *devastated* by the death of her husband, who was only 46 at the time. She noted that, as of that moment, she had suddenly become "an incurably and wretchedly lonely person". Although she had their children, she still had to find **meaning** for the rest of her life.

Spiritual pivot. Although Pierre's sudden death was the bitterest of blows to Marie, it also marked a decisive turning point in her life and career: henceforth, she devoted almost her entire energy to completing *alone* the scientific work they had begun *together* (although she, not he, was most always the initiator). What must be

appreciated is THIS: it was only because Pierre died so prematurely (at 46 when she was 39) that she was able to emerge from behind his shadow.

it was only *because* Pierre died so prematurely (at 46 when she was 39) **that she was able to emerge from behind his shadow.**

Distilling Resilience out of Tragedy. Thus, just one month later, on 13 May 1906, the Sorbonne Physics Department decided to retain the chair that had been created for Pierre Curie, entrusting it to Marie, together with full authority over the laboratory.



So, according to Smithsonian Magazine, *"instead of silently accepting a widow's pension, Marie took over Pierre's position at the Sorbonne, becoming the **first woman** to teach there. Hundreds of people —students, artists, photo-graphers, celebrities—lined up outside the university on November 5, 1906—two days before her 39th birthday— hoping to attend her first lecture*." Pivotal—Marie gave no outward sign of mourning. She had already passed beyond that.

"Nothing in life is to be feared, it is only to be understood.
Now is the time to understand more, so that we may fear less."
- Marie Curie

Re-kindling passion … and scandals! In 1911, five years after Pierre's death, Marie won her second Nobel Prize in Chemistry to become the first person ever to win *two* Nobel prizes. And yet precisely during this time, rumors emerged about her clandestine affair with a married man! To be precise, Paul Langevin, fellow physicist and Pierre's former student and later colleague! The muckraker media immediately hit her with accusations like *'Jewish home wrecker'*.

According to one source (https://piggsboson.medium.com/marie-curies-scandalous-love-affairwith-paul-langevin-and-9-other-facts-7335c15e63ad), Curie was in Belgium at the time, meeting up with famous physicists like Albert Einstein, when this scandal broke. When she returned home, there were angry mobs in front of her house. Albert Einstein even wrote to her privately, saying—

"Highly esteemed Mrs. Curie, Do not laugh at me for writing you without having anything sensible to say. But I am so enraged by the base manner in which the public is presently daring to concern itself with you that I absolutely must give vent to this feeling…" Einstein is also the one who later said—

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

Receiving well-earned praise … but perhaps for the wrong reasons! Marie was also feted in the United States, sailing there in 1921 with her daughters, Irène, 23, and Eve, 16, on a six-week tour. She was even invited to the White House, where then-President Warren Harding spoke at length of her "great attainments in the realms of science and intellect", adding that she represented "the best in womanhood: the noble woman, the unselfish wife, the devoted mother."

Rather an odd thing to say. Then again, President Harding hadn't a clue how to combine women with pioneering science. Moreover, as Smithsonian Magazine pointed out, Marie Curie was *"**never** easy to understand or categorize. Because she was a pioneer, an outlier, unique for the newness and immensity of her achievements."* Poor Harding!

Giving back. From 1922 on, Marie Curie, *"now at the highest point of her fame and a member of the Academy of Medicine, devoted her research to the study of the chemistry of radioactive substances and the potential medical applications of these substances." (Encyclopedia Britannica)*

Taking leave. Her hands scarred from exposure to radium, her bones and body weakened by it, she refused to admit it, but Marie died prematurely by today's standards—at only 66—in the Sancellemoz Sanatorium in Passy, France outside of Paris. Her daughter, Eve, was at her bedside. Ironically, she died on 4 July 1934, America's Independence Day. Her spirit at least ***was*** freed on that day.

Epilogue: AGAINST discrimination, FOR pure science
Happy November 7th birthday, Marie Curie.

By Priyarshini Ghosh, Indian-born chemical and nuclear engineer studying in the United States. When this article came out in 2016, Marie, born on 7 November 1867, would have been 149 years old! Here a few excerpts highlighting what Marie Curie achieved against gender discrimination and for pure science.

“The most fascinating part (about Marie Curie) is that she did not spend her efforts challenging the system for female empowerment but instead stood up for the benefit of science alone… Curie had notably refused awards, honors, even returned scholarship money. Her motivation to take a strong stand was done purely in the name of science

“Her Paris beginnings were quite humble. No university sponsorships. The Sorbonne had not even been willing to provide her a laboratory, but her threat to move to the Pasteur Institute (that did offer to build a lab for her) motivated them to reconsider

“She and her husband Pierre, with whom she bonded over a mutual love of science, discovered the existence of (and named) two elements, Polonium (Po) and Radium (Ra). Beyond that, Marie went on to become the first woman to win the 1903 joint Nobel Prize in Physics but did not stop there. She became the first person ever to win two in different fields; the second time in Chemistry in 1911.

“Despite personal tragedy and scandals, then rampant xenophobia and hypocrisy in the French establishment, as her work work drew growing recognition, she began to tear down the prejudices of society; again not by direct intervention, but
Nommbelf Prizes

but in order to move science forward. Thus, she presented at conferences, tried to donate her Nobel Prize medals to the French National Bank during the First World War and gave away her award money to institutes and scholars, even used her precious gram of radium for the public good.

“During World War I Marie herself served on the frontlines, using her own private one-gram supply of radium to provide soldiers with life-saving interventions. She assisted over a million wounded frontline soldiers with her mobile X-ray units, helping to locate and remove shrapnel from their bodies. Over time, the medical use of radiation has increased exponentially, saving millions more lives from cancer!

“Ironically, since she often carried out her own research directly—and although she herself never said so—it is widely speculated that her own long-term radiation exposure was the reason she contracted the aplastic anemia that ultimately led to her death at 66 in July 1934.”

Her Last Years

Yes, it's true. According to medical sources, Marie Curie died as a result of aplastic pernicious anemia due to radiation overexposure. However, her contribution to science was ongoing, including her influence on subsequent generations of nuclear physicists and chemists, amongst them her eldest daughter, Irène Joliot-Curie, who also won a Nobel Prize in Chemistry in 1935.

In her honor, Marie Curie's ashes were exhumed and enshrined in Paris` Panthéon in 1995; she was the first woman to receive this recognition purely for her own achievements. Her office and laboratory in the Curie Pavilion of the Radium Institute are preserved as the Curie Museum.

As for today … If Marie could see our current world from "the beyond", what might she say? Well, she just might say "YES! I did a good job." At any rate, WE think she did! Just reflect …

Treating cancer through radiation. Is there anyone who ***doesn't*** know someone—in their family, amongst friends or even amongst celebrities—who currently has or has had cancer? And besides chemotherapy, what is this most common treatment for the disease?

Radiation. Also called radiotherapy—and thanks to Marie and Pierre Curie for discovering radium—this is a medical treatment that involves exposing part or all of the body to a controlled amount of ionizing radiation. Goal: kill the cancer cells before they kill their body-host.

Marie Curie and me. My personal connection.

"A successful figure in the field of science, Marie allowed her name to be used by the Marie Curie Hospital in north London. Opened in 1930, it was staffed entirely by women to treat female cancer patients using radiology. It also had research facilities. After this hospital was largely destroyed in 1944 by a bomb, a group of people decided to re-establish it.

"Now, in the 21st century, 'Marie Curie' is a major UK charity for people living with any terminal illness, not only cancer, and their families. It offers expert care, guidance and support to help patients, and their families get the most from the time they have left.

MY personal contribution. Coming in 2004 from WHO's headquarters in Geneva, I was also called to serve in launching PACT (Program of Action for Cancer Therapy) at the International Atomic Energy Agency (IAEA) at the Vienna International Centre in Austria.
In keeping with its original purpose— "Atoms for Peace"—the IAEA established PACT to help integrate radiotherapy into cancer control and engage with other international organizations, such as the World Health Organization (WHO), to address cancer control in a more comprehensive way.

2. Marie Curie. Readers' Interactive Workbook

Whatever your age or current stage of life, interacting with these historic or contemporary characters can inspire your own life, calling up comparisons with the figures featured here. Take a vivid "walk down Memory Lane" and recall challenges that you faced—whether you overcame them or just barely survived with bruisingly useful "lessons learned". This can help you rev up your right-now resilience. *Dare to explore Marie Curie's "spiritual defiance".*

1. Marie—"Manya" as she was affectionately called within her close-knit clan—was the 'baby' of her family. She had three sisters and a brother. Did she let herself be coddled or spoiled as she might have? How did she **set herself apart, personality-wise. How do YOU? With either your siblings or your school friends? What are you "known for"?**

2. Manya was very bright indeed, as were her parents and siblings. Do you think her family influenced her? **Does your family influence YOU? Do you have a role model—living or dead—you look up to, or consult when you're up against a brick wall? Who IS that … and WHY this person?**

3. Manya—in order to *become* "Marie"—had to leave both her family and her country and make her own way in life. **When and how did she do that? Would—or have—you ever done something similar in your OWN life? What if you hadn't? Today, are you glad or sorry that you DID it?**

4. What was the darkest day in Marie's life? Why? How did she react? Did this major catastrophe turn out to have a proverbial "silver lining"? **Have you experienced anything similar in YOUR own life? Were you "resilient"? Was it worth it?**

5. Though outwardly shy and self-effacing, Marie Curie was very strong-willed. One might relate to her robust inner-directedness as opposed to today's trendy Instagram posturing. **Why did she become world-famous? What caused people to admire/love her so~~? Me, too! Wish I'd *known* her!~~ Do YOU? Why—or why NOT? Was she "cool" enough?**

Here is Marie Curie's daughter's own eulogy to conclude this chapter in fitting fashion and as a take-away message for those many of us who may aspire to doing good in this world:

"Gentle, stubborn, timid, curious … and a genius. The life of Marie Curie contains prodigies in such number that one would like to tell her story like a legend. She was a woman; she belonged to an oppressed nation; she was beautiful. A powerful vocation summoned her from her motherland, Poland, to study in Paris, where she lived through years of poverty and solitude. There she met a man whose genius was akin to hers. She married him; their happiness was unique. By the most desperate and arid effort, they discovered a magic element, radium. This discovery not only gave birth to a new science and a new philosophy: it provided mankind with the means of treating a dreadful disease. … I should have liked the gifts of a writer to tell of this eternal student—of whom Albert Einstein said, "Marie Curie is, of all celebrated beings, the only one whom fame has not corrupted." She remained a woman who didn't know how to be famous … but ***was****."*

- Eve Curie, Introduction to
Madame Curie, A Biography