# Success of Marie Curie: Reflections on Gender and Science

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## 1 Marie Curie: A Hugely Successful "Woman" Scientist

Marie Curie is a big figure; everyone knows who she was. She was born in 1867 and died in 1934 when she was 66 years old. She became the first international female scientist after the establishment of the modern university. The reason for purposely mentioning "modern" university is because the university system was born in Europe in the Middle Ages, but at that time, it was strongly influenced by and tied up with Christianity. It was the modern university that was freed from this relationship. In short, Marie Curie was the first international female scientist who received her education from a university that was not associated with religion.

Her notoriety is tremendous; for example, in 1903, she jointly won the Nobel Prize in Physics with her husband, making her the first woman to win a Nobel Prize. Furthermore, she alone received the Nobel Prize in Chemistry in 1911, making her the first person to

receive the Nobel Prize twice.

In 2011, Marie Curie was heavily covered by media. In fact, 2011 was the International Year of Chemistry—the year celebrating the 100th anniversary of Curie's solo Nobel Prize in Chemistry—and Marie Curie was its official representative. For comparison, the official representative of the International Year of Physics was Einstein (1879-1955), and for the International Year of Astronomy, it was Galileo (1564-1642). This shows how great a figure Marie Curie was.

In France, she was said to have received "fame that is deeply infiltrated even among ordinary people who, in general, are not interested in scientific development".[1] In short, everyone knew her. She was so famous that even people who were not interested in science knew who she was.

There are many superb female scientists, but when I ask someone to write down the name of a female scientist they know, most people answer with the name Madame Curie. Why is it that only she became so famous? How did a person born in the nineteenth century achieve such great success? Today, I want to talk about Marie Curie from such viewpoints.

Something that grabbed my attention—though it sounds as if I

have leaped into another subject—was the postscript in a book titled "*An'An" No Sekkusu de Kirei Ni Naritai?* (*Could You Become Beautiful by "An'An"'s Feature on Sex?*), written by Minori Kitahara. In the postscript, Kitahara made a comparison between two women: Yasuko Watanabe, a victim of murder, and Atsuko Muraki, who was cleared of false criminal charges stating she fabricated and issued an official document.[2] Both were career women, but their methods for survival contrasted. The former was involved in something illicit and was killed; the latter, found not guilty and released from jail. What makes such a difference? Their fame, of course, cannot compare with that of Madame Curie. However, I thought the difference might include secret methods or a career woman's common survival instinct. Kitahara remarked as follows:

> It did not just happen because Mrs Muraki took the "wise" way, while the victim of the murder took the "wrong" way. It is not a story that encourages women to take a lead in serving tea at your company. "Setting low goals" and "giving up" in despair, in this society, are completely different. I believe it is what Mrs Muraki had—and the victim of the murder did not—for survival: not giving up and making the best use of herself.

Mrs Muraki told Ms Shoko Egawa (an investigative journalist) the reason that she believed she could have won the trial:

“Having mental toughness for not lose hope, being healthy to keep physical strength, being fortunate enough to meet a good legal team, having economic power that can cover living cost and expenses incurred in defending, and getting understanding and cooperation from family—people cannot fight without a luck that is having these five conditions”

These are things that Mrs Muraki had but the victim did not. We cannot explain how Mrs Muraki won the case by only considering her calm character. It is my belief that all necessary conditions for a woman to survive in this society existed here:

- Mental toughness,
- Physical strength,
- Friends (encouraging sympathizers),
- Economic power,
- Understanding and cooperation from family, and
- Luck to have these five conditions together.

The victim of murder had economic power, but she had nothing but economic power. It took me such a long time to face directly

to the death of the victim.[3]

I agree that there are conditions exist for women to survive in this society. And, I think these conditions not only apply to present-day Japan but also to the era in which Marie Curie lived. Now, I would like to examine the life of this female scientist with you.

Marie Curie's childhood was unpleasant. Marie (her birth name was Maria Skłodowska) was born in Warsaw, Poland, which belonged to Russia—meaning, she was born in an occupied country. Moreover, her family members passed away one after another: her older sister died when Marie was eight years old, and her mother died when she was ten years old. The Skłodowskis were financially burdened as well. Thus, she is often described as a person who succeeded in life through determination. However, Marie Skłodowska-Curie, like Mrs Muraki, also had the conditions needed to survive in her career. I thought she might have just been lucky. For example, to be born to a rich family in an advanced nation would be a good condition at a glance, Marie did not have those but she had something critical that were different from those lucks and thus, she was actually blessed.

For example, when Marie Curie entered the Sorbonne University in

Paris in 1891, she was not the only woman student. If Marie had been the only woman to gain huge success, there might have been something that made her different from the other female students. That would become a clue in common to utilize the ability of women in present Japan, or, in the world

Another aspect I considered was "era." Where mental toughness, not losing heart, and physical strength are individual issues, era is beyond individual efforts. However, both individual strengths and era sided with Marie.

I recall a female Japanese scientist, Toshiko Yuasa. Yuasa was born to a samurai family in Tokyo in 1909—a later era from that in which Marie lived—went to France to study, became a pupil of Frédéric Joliot-Curie (1900-1958; Marie's son-in-law), and received an academic degree in 1943. Later, she became the first Japanese scientist to obtain a full-time job in France. Yuasa died in Paris in 1980. Especially when you consider the era in which she lived, she had greatly succeeded as a Japanese woman. However, in her case, World War II happened between her overseas educations. Later, she wrote about that time:

> “I usually am suspicious how much human talents (besides knowledge) could be expanded by education. Rather, though it

is pessimistic, I strongly feel that obstructing the natural birth and development of human's talent and personality was harmful for human's talent.

I think that education does, after all, only have passive meaning which exterminates such bad conditions as much as possible to make a suitable state for maximum development of individual talent. In this aspect, I consider how this war, in other words, World War II, ruined the destiny of so many talents which should be developed.

I also had the normal development of my own ability interrupted by the war, and when I came back to this laboratory in Paris, I keenly realized that the five years after the war brought an irrecoverable loss on me.

I, of course, have been making every effort to recapture this loss, but it is quite doubtful if such effort is effective. I have very pessimistic feelings, which is like a water plant which flows to the mighty waters; it would be impossible for someone that once went away from a shore to come back to the shore again."[4]

That is, there was an interruption in her career having no relationship to the individual efforts of Toshiko Yuasa.

When we examine the career of Marie Curie from this perspective, we can see that she had a slow start—partly because she was born in an occupied country—before she entered a university. For example, she graduated from an educational course, then high school at the age of 15; however, when she entered Sorbonne, she was 24 years old. It took some years for her to save enough money for school expenses. However, once she was in Paris, she did not have any of the interruptions Toshiko Yuasa experienced. She experienced World War I, but it was after she had achieved some success. I believe that such luck also contributed to the birth of Marie Curie as a worldwide scientist.

## 2 Born of a Scientist: Marie Curie and the Discovery of Radioactivity

Let's look at Marie's life in detail from the perspectives of her family and friends, and then examine her "mental toughness to not lose heart." What was her family structure like? She had parents, three older sisters, and an older brother; she was the youngest of five children.

Her parents were teachers, and they were an unfortunate couple of educators. Both of them took much pride in being Polish, and her

mother was a faithful Catholic. Catholicism was the major Christian denomination in Poland during Marie's time.

When the country was occupied by Russia, the ruler disliked people who clearly showed their pride in being Polish. Marie's parents were intelligent people with culture—Marie came from decent family—but because they did not fawn on Russia, they lived in obscurity.

Marie's mother had tuberculosis during Marie's childhood. Thus, Marie could not be cared for by her mother very much. The oldest daughter in the family was a child with a strong sense of responsibility, and she supported their mother most eagerly. However, she caught enteric fever when she was tired, and she died. At that time, Marie was eight years old. The mother was driven to despair in a great way by the death of the dutiful daughter. The mother rapidly fell into poor health and died only two years after her oldest daughter's death. Marie suffered the deaths of many family members during her childhood. Since her mother was a very faithful Catholic woman, she viewed her mother as an image of the Virgin Mary. If such a pious person could die like a dog, then what did God do for people? Marie was very doubtful about religion after this incident.

At that time, there were two pillars of alignment for Polish people:

Catholicism and the Polish language. Russia tried to deprive the Polish people of these important things. In general, when country A occupies country B, country A takes B's religion and national language away to make B assimilate into the culture of A.

Alternatively, if the people of an occupied country can protect these two important pillars, they could resurge again. An example of this is Greece. The nation was occupied by Turkey for a long time, but they protected the Greek Orthodox Church and the Greek language, so they might be independent again later. When these two things disappear, the nation will perish.

Marie abandoned one of these two pillars. She discarded the big issue, religion, and threw her heart into science instead. One of the reasons she was so devoted to science was because her father was a teacher of physics. Marie's father had wanted to become a researcher, but due to the condition of his country and the economic problems they suffered, he sacrificed his dream and became a teacher. Yet, in his heart, he never let go of the desire to be a researcher. Because her mother, suffering from tuberculosis, could not take care of Marie very much, naturally, Marie held an Electra complex. It is no surprise that she held such a feeling as to be an heir to her father.

The Polish society had been searching for a way to eradicate their

humiliating situation. They, of course, took up armed conflict for independence, but they soon realized that way alone was not going to be enough. Intellectual figures in Poland brought attention to the cultivation of human resources. Even if they had succeeded in overthrowing the government through revolution, it would have been useless if they could not keep their regime in power. To continue their independence, it was necessary to increase the levels of intelligence of people in the nation. Therefore, Poland put emphasis on education, especially scientific education.

Though Marie discarded her religious faith when she was about ten years old, she devoted herself to "faith in science." Individually, she had scientific talent; yet, she was also conscious that she, in taking charge of the destiny of her nation, studied science for her nation as well.

Given the circumstances, Marie's entire family was very supportive. Her brother and one of her sisters became medical doctors, while the oldest sister became the principal of a senior high school. In short, the children in Marie's family all had careers. This is not only because the family members loved to study, but also because, as Polish people, they had determination to defeat Russia through the acquisition of knowledge. Thus, each family member stayed out of the

other's ways and supported one another. Of course, other Polish people the family knew also supported their compatriots with great interests in learning.

Considering previously mentioned Muraki and Mary, there is a similar point among them: the mental support from Marie's family was perfect like Muraki’s. In her mind, there was absolute conviction that her late mother and sister would have been by her side had they still been living. Thus, Marie's childhood had never been disturbed by her family members, either living or dead. On the contrary, everybody supported her to end of her lifetime.

Surely, it was unpleasant to be born in an occupied country or to be born to a poor family, but Marie had something that outweighed the negative condition. Let's examine an opposite case.

There was a woman who lived in a generation before Marie's. She also became a great figure in the world. She was the daughter of a venerable family from an advanced nation. This woman is definitely included in many biographies for children. Can you guess who she is?

Yes, the answer is Florence Nightingale (1820-1910). Florence was born to a rich family in England. She was named Florence (Firenze in English) after the town she was born in during her parents' long-term overseas trip.  She was born in a high position that

afforded her parents the opportunity to take a trip for several months without doing any work during the trip. However, this "position" also disturbed her career options.

Florence's desire to be a nurse was strongly opposed by her family because they thought it was an improper action for a girl in high society. Her mother fainted all too often, and her older sister was half-mad. All the relatives ganged up against her. It took about ten years for Florence to become a real nurse after she started studying. During that period, she was bullied in “her house”.

Florence was financially comfortable and had strong connections in social circles. She had many friends and acquaintances in the centre of administration. Thus, after she became a nurse, she made the most of her position by dedicating her time to patients and hospitals. This could never have been done by a woman who was born to an ordinary family.

Until she became a nurse, she was abused by her family. She was told horrible things like "Your wish was the shame of our family," "You should consider your sister and relatives," and "Your wish will put everyone in trouble." Because of this, Florence was depressed for a period of time. However, Marie Curie never had such an experience.

At a glance, it looks as if Florence might have been blessed much

more than Marie, but in essence, we could not simply say so. At that time, laws were patriarchal; only because her father allowed her to pursue her dream was she able to become a nurse. However, her mother and sister complained about it their entire lives. It seems it would be much better for a person to be financially challenged and have everyone's support than it would be to have a lot of money and family members who complained their entire lives. Thus, I believe Florence had a tougher time in life than Marie did.

The next fortunate circumstance for Marie was a family in France. Marie Curie did not want to be a scientist from the beginning. She originally went to France to study to become an educator in Poland, a common wish among students from Poland.

Marie's older sister entered the medical school of Sorbonne and opened a hospital in Paris at first. However, in the end, she established a tubercular sanatorium in Zakopane, Poland (which was occupied by Austria at the time) to treat Polish tubercular patients. Her brother also worked as a medical doctor in Poland after he studied in University of Warsaw. All Marie's siblings served their country well. Marie had intended to go back to Poland after her graduation from Sorbonne and become a teacher of physics so she could educate intelligent Polish people like herself.

However, she met Pierre Curie (1859-1906) in France and they were married.

There are, in fact, other couples who are married in such a way; Einstein's case is famous. He married twice. First, Einstein married Mireva Marić, a female student from Serbia, a place dominated by the Austro-Hungarian Empire.

However, Einstein's marriage failed. Einstein's parents were horrible to Mireva, especially her mother-in-law who had been opposed to their marriage from the beginning. Despite her wish to have an ordinary housewife for her son, he married a classmate who also majored in science. Einstein divorced her and remarried a Jewish woman—same as Einstein—who made a good housewife.[5]

Marie did not have this type of trouble. Pierre had an older brother who was also a scientist. Moreover, their father was a medical doctor, and like Marie's father, he had originally wanted to be a scientist, specifically a medical scientist. However, for economical reasons, he became a practicing doctor instead. Yet, he held on to the dream of being a scientist, and his wish was carried on by his two sons.

Pierre was a very strange child. For example, when mathematics class would start, he found it difficult to stop doing math 45 minutes later, take a ten-minute rest, and then jump into physical training.

Once he became focused in mathematics, he wanted to continue solving mathematical questions. Once he was keen on something, he could not break his concentration and move to the next thing. Thus, although he had the power of concentration and academic ability, he did not fit in the school system. Since the father had his own unique view on education, he offered home education to the older son—who was more normal than the second son—not allowing him to attend schools until he entered a university. To the second son, he offered a special education, which was to let him focus on his favourite subjects. The compulsory education system had not yet started in France. Home education itself was not an unusual thing. Pierre first entered the Sorbonne at the age of 16. In short, Pierre was a quite an eccentric person. When he met Marie, he was about 35 years old, single, and lived with his parents. His older brother had been married and left home a long time already.

For Pierre's parents, it was a matter of great celebration when Pierre brought Marie home. Had things continued the way they had been, they were sure their second son would have been single forever. Opposition was the last thing they felt. They must have felt very relieved.

In addition, Pierre's father not only wanted to be a scientist, but

also politically held sympathy toward Marie's circumstances. He was a person who believed somewhat revolutionary ideas. After the French Revolution, France had changed from a republican government of freedom, equality, and fraternity to a monarchy such as an imperial government or imperial rule. Therefore, there were various revolutions happening in the nineteenth century. Pierre's father was a genuine pro-republican, so he was fond of his daughter-in-law. He found something in common with the woman who had worked hard for Poland's independence. Pierre's mother, who died just after their wedding, did not remark one way or the other about what she thought of her daughter-in-law; yet, his father had given continuous support to Marie, the wife of his son. I think that he surely must have seen some of his ideals in her.

It would be very difficult for a woman not to have the support of her own family or husband. Even if the woman was enormously neglected by her in-laws but had a supportive husband, there is the possibility the marriage will fail, such was the case in Einstein's first marriage.

Pierre's older brother also had great faith in Marie. After she was widowed, she was criticized in an immoral scandal. In a public statement made to protect her, he stated how happy his younger brother was when he was married to Marie and declared that he would

always be on Marie's side no matter what happened. Considering the moral standard at that time, the statement was a great thing. People around her supported her to such an extent. That's why she was able to achieve such great success in science.

As for the physical environment of research, Pierre and Marie were not favoured. It is an absolute truth. Because the husband and wife did not have power in academic society at that time, they conducted their research in a wattle hut and took four years to extract radium. This was a job that would have taken two years to complete in an advanced laboratory.

Yet, when we consider women's social progress, when a woman has troubled relationships with the people close to her, even if she has an abundant budget, she will have a much more difficult time. There is nothing better than being favoured in both aspects. However, if a person has to choose just one, I believe the one who doesn't have trouble with relations will be much better as a matter of gender. People place much more importance on a woman's position in her family, such as wife or mother, than that of a man's; therefore, if a woman has trouble within her family, the possibility that the trouble affects her work is higher than for a man. This is made obvious, for example, by observing the fact that what Pierre did as a husband or a

father is less talked about than Marie. Marie is a rare person who held a treasure that cannot be bought with money: the support of her own family and her husband's family. Under these circumstances, she received two Nobel Prizes.

The details of the research were as follows. An elite French scientist, Henri Becquerel (1852-1907), discovered uranium's radioactivity first. Marie Curie read the dissertation and conducted intensive research, examining many different things such as whether another element exists. Then Pierre joined the research, and they discovered two new elements: radium and polonium. The Nobel Prize in physics was given to all three people together for the "discovery of radioactivity."

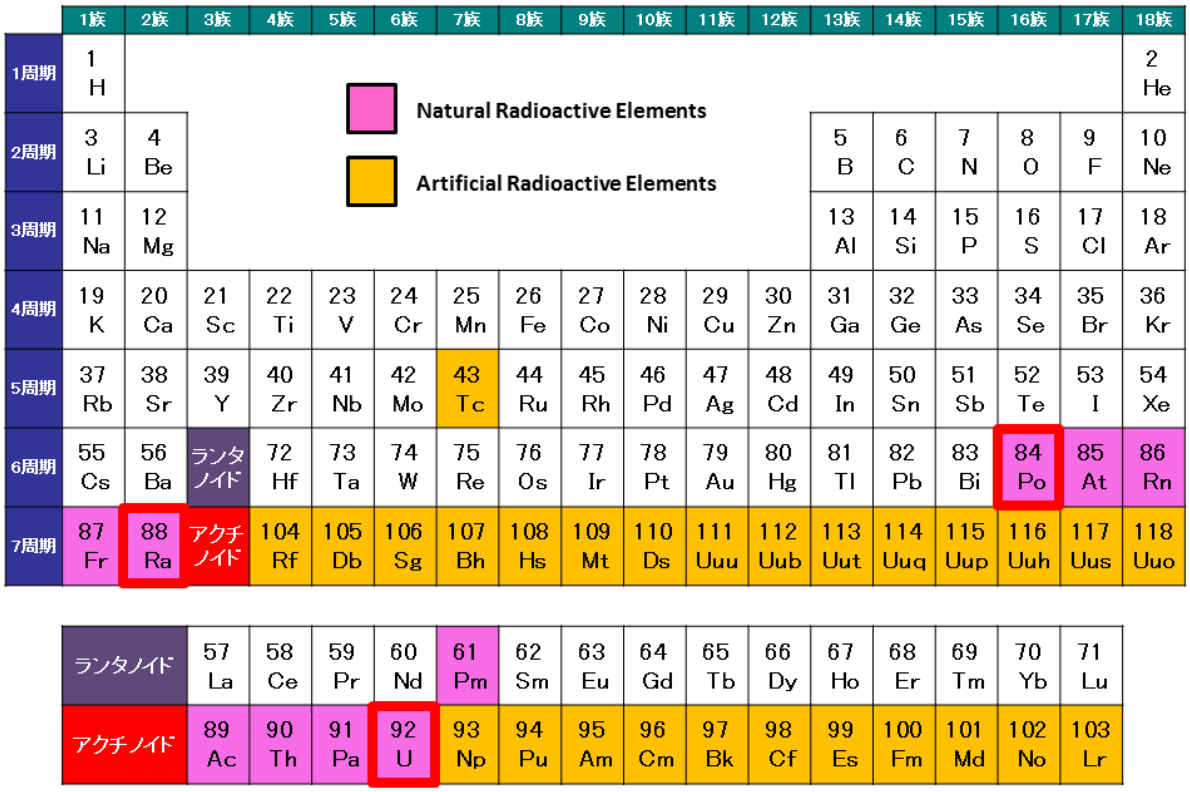
Pierre and Becquerel passed away. Marie, then alone, succeeded in isolating metal radium.[6] Radioactive elements are basically metals. Thus, uranium, radium, and polonium are all metals, but neither of them exists as a form of metal in nature. She extracted the radioactive elements artificially, meaning she conducted the work of an ultra-technique that is matched by none. Nobody has succeeded in performing the extraction since then. These achievements allowed her to win the Nobel Prize in chemistry for "discovery of radium and polonium," different from her first Nobel Prize in physics.

In 1935, her spouse and eldest daughter received the Nobel Prize in chemistry for the discovery of artificial radioactivity. The eldest daughter, Irène, married a scientist. The couple, like her mother and father, won the Nobel Prize as well. Irène's husband later became Toshiko Yuasa's teacher. Her second daughter, Ève, became a journalist and wrote *Madame Curie,* a famous biography about her mother who is well-loved even now. She also was not completely unrelated to the Nobel Prize. When her husband was a president of UNICEF, she attended the awarding ceremony for the Nobel Prize for Peace, which was discussed for this organization. Of course, at that time, Ève was not just a wife; she also had been conducting humanitarian work with her husband.

As a wife, Marie won the Nobel Prize along with her husband—and won the Prize by herself. As a mother, she raised a daughter who was capable enough to win the Nobel Prize as well. Looking at her from this perspective, it seems that Marie did great as a wife as well as a mother. This is also a reason that Marie Curie is more famous than other female scientists. Because of gender biases in society, she would not have been "popular" if she had been a single woman all her life or if it had seemed as if she had a dysfunctional family. Simply speaking, when people supported a woman in such a situation, the

supporter also would have been attacked by society. Therefore, people could not support her without considerably strong wills. In that regard, Madame Curie was a great woman figure whom people could laud without worrying about being criticized by society.

## Periodic table of the elements




| | 1族 | 2族 | 3族 | 4族 | 5族 | 6族 | 7族 | 8族 | 9族 | 10族 | 11族 | 12族 | 13族 | 14族 | 15族 | 16族 | 17族 | 18族 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1周期 | 1 H | | | | | | | | | | | | | | | | | 2 He |
| 2周期 | 3 Li | 4 Be | | | | | | | | | | | 5 B | 6 C | 7 N | 8 O | 9 F | 10 Ne |
| 3周期 | 11 Na | 12 Mg | | | | | | | | | | | 13 Al | 14 Si | 15 P | 16 S | 17 Cl | 18 Ar |
| 4周期 | 19 K | 20 Ca | 21 Sc | 22 Ti | 23 V | 24 Cr | 25 Mn | 26 Fe | 27 Co | 28 Ni | 29 Cu | 30 Zn | 31 Ga | 32 Ge | 33 As | 34 Se | 35 Br | 36 Kr |
| 5周期 | 37 Rb | 38 Sr | 39 Y | 40 Zr | 41 Nb | 42 Mo | 43 Tc | 44 Ru | 45 Rh | 46 Pd | 47 Ag | 48 Cd | 49 In | 50 Sn | 51 Sb | 52 Te | 53 I | 54 Xe |
| 6周期 | 55 Cs | 56 Ba | ランタノイド | 72 Hf | 73 Ta | 74 W | 75 Re | 76 Os | 77 Ir | 78 Pt | 79 Au | 80 Hg | 81 Tl | 82 Pb | 83 Bi | 84 Po | 85 At | 86 Rn |
| 7周期 | 87 Fr | 88 Ra | アクチノイド | 104 Rf | 105 Db | 106 Sg | 107 Bh | 108 Hs | 109 Mt | 110 Ds | 111 Uuu | 112 Uub | 113 Uut | 114 Uuq | 115 Uup | 116 Uuh | 117 Uus | 118 Uuo |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ランタノイド | 57 La | 58 Ce | 59 Pr | 60 Nd | 61 Pm | 62 Sm | 63 Eu | 64 Gd | 65 Tb | 66 Dy | 67 Ho | 68 Er | 69 Tm | 70 Yb | 71 Lu |
| アクチノイド | 89 Ac | 90 Th | 91 Pa | 92 U | 93 Np | 94 Pu | 95 Am | 96 Cm | 97 Bk | 98 Cf | 99 Es | 100 Fm | 101 Md | 102 No | 103 Lr |

Finally, the property of radioactivity is another reason that makes Marie famous. There were many great scientific discoveries, but most of them required much knowledge to understand and did not look as if they directly related to people's regular lives. However, although radioactivity is invisible to the eye, it directly relates to our lives. For example, in Japan the nuclear accident happened in Fukushima

because of an earthquake, and radiation exposure occurred among ordinary people. Radioactivity is also such a concrete discovery.

I would like to discuss a little bit about the difference between Henri Becquerel and Marie Curie. Becquerel discovered radioactivity in uranium, but he did not clearly mention whether it was a physical phenomenon or a chemical one. However, Marie made a firm statement that it is a physical phenomenon. This was the biggest achievement for her as a scientist. This led to her discovery of radium and polonium. When we see a periodic table of the elements, the atomic number of uranium (U) is 92. Radium (Ra) is 88, and Polonium (Po) is 84. Incidentally, the atomic number 87, Francium (Fr), was discovered by a pupil of Marie Curie.

How was radioactivity considered at that time? Since a radioactive substance gives off heart and light when it radiates radioactive rays, it was thought that it would be very useful. First, applying radioactivity to medical care had been undertaken. The influence of radioactive rays from Radium to skin was discovered not only by the Curies but also by a German medical doctor. When Radium is exposed to healthy skin, it makes skin sore. If it were the only phenomenon caused by Radium, it would just be scary; however, it was believed that it could be used to clean unhealthy skin—thus, to remedy the skin of disease.

Applying the emanation from Radium to skin had been popular at that time and was called Curie Therapy.

Pierre Curie said the following in his speech during the awarding ceremony of the Nobel Prize:

> In the biological sciences, the rays of radium and its emanation produce interesting effects which are being studied at present. Radium rays have been used in the treatment of certain diseases (lupus, cancer, nervous diseases).
>
> In certain cases, their action may become dangerous. If one leaves a wooden or cardboard box containing a small glass ampulla with several centigrams of a radium salt in one's pocket for a few hours, one will feel absolutely nothing. But 15 days afterwards, redness will appear on the epidermis, and then a sore which will be very difficult to heal. A more prolonged action could lead to paralysis and death. Radium must be transported in a thick box of lead.[7]

This was the beginning of radioactive therapy.

For ordinary people, what had Madame Curie discovered? People had an image that she was a person who discovered medicine rather than a person who discovered new elements. This was especially so

in the US as it was advertised as "Madame Curie who conquers cancer." The work of Mr and Mrs Curie ended up being considered a medical discovery, and this made her a person with a powerful reputation.

Another application of radium was a territory of coating materials that utilizing feature of radium; it shines in the dark. When radium is mixed into fluorescent paint for a clock face, it shines well; so radium was actively used in clock factories. The richest country after World War I was the US, and radium was massively developed and produced in clock factories in the US.

Lucky for enterprises, there was no royalty required. Pierre was an eccentric person with the mind of an idealist, and he was ignorant about money and honour. He insisted that one should not make money by pure science; thus, the husband and wife did not obtain a patent for their radium production method.

This noble action worked negatively. Since there was no royalty required, enterprises could freely produce radium. In clock factories, workers wetted the tips of their brushes on their tongues to make them sharp. Thus, those factory workers ate radium, meaning they had internal exposures. Many female factory workers died of chin cancer. In the end, it resulted in court action, and the case was

decided in favour of the female factory workers. However, the impression of "a specific medicine for cancer" was strong; the danger of radioactivity was seldom taken up among ordinary people.[8]

Moreover, the story of "medical treatment" had been further escalated. Some people thought that if it healed skin cancer, it could also make normal skin more beautiful or make internal organs appear healthier. Thus radium-containing cosmetics and health foods hit the streets, and because "it shined", products such as radium-containing steel wool were also launched.

Fortunately, it is said that most of them were fake products. However, there was mineral water that actually contained radium, and some people were killed by drinking too much water. From the 1920s to the 1950s, many radium-containing products were introduced. Meaning that, even after the atomic bombing of Hiroshima and Nagasaki, such products were available in the streets[9]. It is an unbelievable story, and unsurprisingly, the fame of "Madame Curie" remains enormous.

## 3 Marie Curie and Gender Problem

Let's go back to the historical circumstances again. In what kind of era did Marie Curie live, from 1867 to 1934?

Basically, her mentality is that of the nineteenth century. Even though she lived until the twentieth century, it was the late nineteenth century when her personality was developed. What kind of era was the nineteenth century? To know that, let's compare the nineteenth century with the eighteenth century surrounding the French Revolution, especially in the aspect of fashion.

Roughly speaking, the eighteenth century was the era in which aristocrats had power, while the nineteenth century was the era in which the bourgeois had power. How did the ideal gender roles of men and women in each era influence fashion? The difference between the eras was especially obvious in men's clothing. Ruling-class men's clothing in the eighteenth century was, in addition to using fancy colours, decorated gorgeously with embroidery or lace. There was no difference in the impression of clothes between men and women, while there was difference in its forms: skirts for women and *culotte* for men. However, it was not the same in the nineteenth century. The basic men's clothes of the nineteenth century were dark suits and white shirts, and they were very conservative.

It is the difference in how clothing was interpreted between aristocrats and bourgeois: bourgeois were capitalists and they were people who worked. So men worked. Clothing in the nineteenth

century showed a concept of out with men and in with women through their fashion. Of course, this does not mean that men in the ruling class were engaged in physical labour. Yet, those men, unlike men in the eighteenth century, never wore pastel-coloured silk clothes full of embroideries. Since the ideals of the upper class affect the thoughts of the lower class, such gender role became the ideal of the nineteenth century. To put it another way, in the eighteenth century, the era in which upper-class men and women wore flashy clothes, the ideal of the society was, for both genders, not to work but to flutter in society. However, the ideal of the nineteenth century changed as men worked outside and women managed homes from the inside—or were beautifully dressed as the personal property of a man to show his earnings to society. In the nineteenth century, it became understood that men should not show off their earnings through their clothing. You cannot see wealth disparities from a distance by dark suits, but dresses show the difference between wealth and poverty. The key to showing the difference is, first of all, "colour". As there were no dry cleaners at that time, only rich people could wear bright coloured clothes in a clean state. Poor people could only wear dark-coloured clothes that didn't need to be washed, or used clothes that were already dirty. Thus, women could display wealth disparity from a

distance to people around them. That means, in the nineteenth century, setting reality aside, it was emphasized, as an ideal, that the role of men and women were extremely different. That was one aspect of the nineteenth century.

However, the nineteenth century had another aspect: the realization of liberty, equality, and fraternity that were symbolized by the French Revolution. Unsurprisingly, the concept of gender equality was also contained. In the nineteenth century, how equality should be was discussed in various ways.

People were swinging between the equality that emphasised gender differences; in other words, equality of emphasizing "whether a gender bears children or not" and equality in a form of reducing gender differences. In either case, there was the tendency to think that some sort of equality had existed in the nineteenth century.

Therefore, there was another trend in fashion in the nineteenth century. For example, sports fashions that appeared in the end of the century, for women, became very simple; though the opposite was true in the aspect of decoration, which was similar to the eighteenth century's concept in the aspect of gender role. Here, what men and women aimed for was not so different by gender. To encourage women to ride bicycles by mounting them like a saddle as men did, the

bloomer style, a fashion that Marie Curie wore on her honeymoon, was introduced.

The nineteenth century was the era that men and women became different creatures; though, a minority insisted that men and women could do the same things. In the second half of the century, the voice of the latter had become bigger. In part, because of such conflict, women were eventually allowed to enter universities.

The movement that showed the tendency of the latter most clearly is the first wave of feminism aimed at winning of women's suffrage. The universal suffrage for men was allowed, not in the French Revolution, but after February Revolution in 1848. As demonstrated by men's clothing of the nineteenth century, men in suits were all the same, regardless whether they wore poor suits or fine suits,—and likewise, every man, rich and poor, had the right to vote.

On the other hand, for women, wealth disparity could be seen at the first glance. As in the eighteenth century, even the era went into the nineteenth century—and women, both rich and poor, had no right to vote. Yet, this problem had been smouldering for a long time. Finally, a big movement to permit women's suffrage occurred. Even in Europe, there were countries that emphasized gender differences and those that did not. Marie Curie grew up in a culture that encouraged

intellectual curiosity for both men and women. That is related to the fact that she was Polish at that era.

Poland, in fact, was the second largest country in Europe, following Russia, in the era of Copernicus (1473-1543) in the sixteenth century. The country had economic power and land with fertile soil. However, in an era around the French Revolution, the country became very small. The country was divided and ruled by Russia, Prussia (later, the Germanic Empire), and the Holy Roman Empire (later, the Austria-Hungary Empire) and had been becoming smaller and smaller. When Marie Curie was born, Poland completely ceased to exist.

On the contrary, this tragedy created the Polish people's mentality to bend to sexual equality to a considerable extent. Again, human resource development was necessary for them to escape from this occupied situation, and for that reason, they were in a circumstance in which they could not be particular about gender. In short, Maria Skłodowska lived in an environment in which people could say women need not study. Among Polish people, there was an idea that everybody should work together to realize the independency of their mother country, and if women just stayed in houses, the country would have insufficient human resources.

Due to Russian policy, girls could not enter university in a Russian territory, so in Marie's family, one of the older sisters and Marie went to abroad to study. It was not a special case particular to Marie's family; actually, many people in such a situation existed in Poland.

Of course, to go to an advanced nation, France was a tough place for Polish people at that time because of the high price of commodities and the language difference. When Marie entered Sorbonne, surprisingly, there were few French female students there. For women, foreign students were the overall majority. Polish female students alone numbered more than French female students. This is an unbelievable story. It would be surprising, for example, if foreign women students are the majority in campus in Japan today.

However, such a section exists in Japanese universities. I am a teacher at Nagoya Institute of Technology, and I think that most polytechnics or departments of engineering science in Japan have the same situation. In such universities, there is a section that has a higher ratio of foreign students; the tendency is obvious for female students. Occasionally, I notice female students in a class; most times, they are foreign students. Can you guess what section that is?

The answer is a doctoral course. At Nagoya Institute of Technology, both male and female Japanese students are an

overwhelming majority in an undergraduate course, but the number of Japanese sharply declines in a doctoral course. As for women, there are more foreign students than there are Japanese students. Chinese women in the doctoral course number more than Japanese women. Why? Why are the overwhelming majority of women who enrol in engineering doctoral courses in Japan foreign students? In reverse, why do Japanese girls not enrol in the doctoral courses in engineering departments?

It is the problem of exit, or employment. In Japan, there is little opportunity for employment in private-sector companies for students who have graduated from engineering doctoral courses. This tendency is especially strong for female students. That's why they do not enrol in doctoral courses. Men as well; it is easier for students with master's degrees to find jobs—even excellent Japanese male students would not go through doctoral courses after they graduate from master's courses. All of them steadily find posts in big private companies.

When we consider why people go to university and why a certain department is popular and another is not, in most cases, it is largely related to the exit, in other words, the employment situation. Thus, Japanese enterprises hire many women who graduate from doctoral

courses in engineering departments; women go to doctoral courses. In reality, enterprises shy away from students with doctoral degrees, especially female students; so most women, regardless of their scholastic abilities, do not choose the course.

Now, let's go back to France in the late nineteenth century. What would have happened if the previously mentioned mechanism worked there? Surely, unlike in Russian territories, women could enrol in universities in France. Yet, it was a system that was established under a situation which was governed by political principle. While the door was open, there was no exit. There was an atmosphere in society that, in employment or marriage, going to universities did not work favourably for women. Therefore, even excellent girls did not want to go to universities, or their parents did not want them to go to universities. Because of that, in France—even after the law permitted women's enrolments to universities—there were few women's high schools that provided students credits that were necessary to enter universities.

It was foreign girls—for example, Polish girls—who made effective use of the door to be women university students that was opened by France. Thus, they went to French universities despite the high living costs and language differences. Moreover, there were many women's

high schools that provided students credits in subjects that were almost equal to those of men's in such countries.

Therefore, at that time, to become women scientists, was it more advantageous to women to be born in Poland or in France? The answer, in fact, might be to be born in Poland. From this point, to be born in Poland was not adverse circumstances. So, from the aspect of women's enrolment to universities, it might have been far more adverse a circumstance for a girl to be born in France, or, as we saw in the case of Florence Nightingale, born in England.

Another common example of a story of adverse circumstances is the incident involving the Academy of Science—the most prestigious group of scientists in France—in which Marie Curie, the Nobel Prize winner, failed in its membership election. Incidentally, Becquerel, the co-winner of the 1903 Nobel Prize in physics, and her husband Pierre were members of the Academy.

As the couple won the Nobel Prize together, and the husband was a member of the Academy, we assume that the wife held sufficient qualification in ability to be its member. However, the organization, established in the seventeenth century, never allowed female membership. Thus, mass media eagerly started to deal with the news as soon as Marie Curie stood for its membership—and in

very vulgar ways. For example, an illustration drew Marie in white lace cloth on a plate of balance scales, while on another plate there was a serious looking male candidate who carried in a newspaper. Such images completely overlapped with the fashion image of the nineteenth century that emphasized the gender difference. In short, it contained the message that we should allow a person of a gender symbolized by lace to enter the Academy of Science.

As for direct relation to fashion, there was a problem with the Academy member's uniform. It was set in the era of Napoleon, a military uniform. It was determined that every member of the Academy would carry a sword when he wore the clothes. As Napoleon promoted a thorough sexual division of labour between men and women, he did not imagine that women would become members of the Academy. So he made the uniform of very "masculine" design. Tiny things were eagerly discussed, such as, should a woman become a member of the Academy, she would wear the uniform with trousers or make a special skirt.

After all, Marie Curie was defeated to a French male scientist whose achievement was obviously inferior to hers. She lost by a two-vote margin. She was exposed to such an "unscientific" attack. It is an incident that is said to be of typical sexism. However, a two-vote

margin also means that she almost won. It was her competitor's second challenge; he lost his first challenge. Rarely are people elected at the first challenge.

The reason why I stress this story is that we can learn something interesting by comparing this with her daughter Irène's candidature for Academy member. After World War II, French women finally obtained the right to vote. Irène, like her mother, was the Nobel Prize winner, and her husband was the co-winner and a member of the Academy. However, she lost the election three times in the 1950s. Moreover, she lost the elections by an overwhelming margin of votes. That was so different from her mother who lost the election with only a two-vote margin in the 1910s. Why did the daughter lose the election by a huge margin of votes?

It is true that, considering the situation regarding the rights of citizens, women were at more of a disadvantage in the 1910s than they were in the 1950s. However, it was an era of increasing momentum toward women's suffrage; the momentum that pleas "everybody should get the right to vote from now on." People who insisted upon gender equality supported Marie's candidature in the 1910s. Those people did not actually know Marie in person, and the same is true of her opponents; people made two groups—to either

support or to criticize her. Hence, both the offence and the defence were excited in a sense, so it was a relatively "progressive" era. It was an unpleasant memory for Marie Curie, but in fact, it was an almost-win election. Viewed in this light, we can see this as a phenomenon of the first wave of feminism's victory.

As for public opinion toward women's social advancements, Irène had a more stormy life. Actually, the 1950s was a very conservative era. The tendency to shove women in to their homes when the men returned from battlefields was obvious in Western countries.

In contrast, and as is the case with Marie Curie, from the time of her birth to her death, the status of women had been almost continuously improved. It is true that Marie was already dead when French women attained suffrage. She did not have the right to vote in her lifetime—in Poland or in France—but she had the hope that women would definitely obtain suffrage in the future.

As for her mother country, the decolonization of Poland was realized after World War I. So, she saw the situations from "want to be independent" to "become independent". Regarding women's rights, she lived in an era in which circumstances changed from "want to have" to "will have in the near feature". In that sense, I think that, though she did not have any physical rights, she ended her life in

hope or as a person who spent her lifetime hoping.

Of course, it was inconvenient for a person to not have actual civil-rights even though they had hope. For example, if a person became a widow, like Marie, she faced hardship. Until the establishment of women's suffrage, French women did not even have the right to open bank accounts. Marie lost her husband in 1906. Her own family lived in Poland. Her father-in-law, Eugène, who had always supported her, also passed away several years after. At this point, she had no male relative who lived in her neighbourhood. So, a pupil of Pierre became the guarantor of Marie and handled necessary things for her, including the management of bank deposits. Even the person who won the Nobel Prize twice could not have a banking account because she was a woman.

On another matter, Coco Channel (1883-1971), who was a big business figure at that time, was in the same position. Therefore, Channel's wild romance with powerful men also might need to be considered from this perspective. Being a woman was tough because, no matter how capable a person was as a scientist or business person, a woman could not make any business agreement nor save money without a male guarantor. In that sense, the situation in France was worse than that in Japan. The situation continued like this until the

end of World War II.

Another story of discrimination against women that has been told often is the alleged infidelity called the Curie-Langevin affair. It was five years after the death of Pierre Curie. Marie failed the membership election of the Academy in January 1911, yet she received the 11th Nobel Prize in chemistry, her second Nobel Prize. In fact, just before the announcement of the Nobel Prize, a popular press carried an article that she was having an affair with Paul Langevin (1872-1946), a pupil of Pierre's and a man five years younger than Marie. Because of this, the mass media had fooled around with her and her children.

As a discriminatory practice against women, criminal law treated infidelity completely different depending on one's gender. If a man had an extramarital affair, he was found guilty only when he insisted upon bringing his lover into his home, in other words, if he made the woman live with his wife. However, the punishment was only a pecuniary offence.

If a woman had an extramarital affair though—if she or her lover were married—the woman was sentenced to jail. Punishments were completely different by gender, even though they committed the same crime. If a man whether he was single or married had an affair with a married woman, the husband could sue the man. So if Marie had an

affair with a man when Pierre was alive, Pierre could sue the man. However, if it was Pierre who had an affair, Marie had very little rights in this matter. Only men had the right to sue properly or request punishment against his wife's lover. In short, women were properties. The law at that time was set with the thought in mind that a man should not steal a married woman because she is the property of her husband. If a married man had an affair with a single woman though, he did not have to worry about his wife, aside from the duty of support.

What would have happened if an issue like the Langevin-Curie affair had occurred? At that time, Langevin was a professor at the School of Physiques and Chemistry (*École de Physique et de Chimie*) and at the *Collège de France*, and Marie was a professor at Sorbonne University. The schools of Langevin did not say anything about this scandal: "a man's affair is a familiar story"—that's all. However, Sorbonne University had a great fuss about whether the university should fire her.

Moreover, this sandal was related not only to gender but also to prejudices toward foreigners and religious problems. A criticism against her, stating that "an atheist Polish woman is occupying the post of which a French man should sit," was fulminated as much as

the "extramarital affair." Marie was considered to be a destroyer of French tradition. In France at that time, the majority of women were faithful Catholics. However, as mentioned before, Marie abjured her religion when she was ten years old and married Pierre who was also an atheist. And she did not invite a priest to her husband's funeral. Since the death of Pierre was reported all over the world, Madame Curie's unbelief became a well-known fact. She was accused of being "an immoral foreign woman" who was beyond the norm of a "sound French woman."

It is very impressive that two female friends of Marie's, who were involved in the women's suffrage movement, came to Marie's defence. Her French friend was an author named Marguerite Borel, and her British friend was Hertha Ayrton (1854-1923), a scientist. Borel's father was the head of the science department at Sorbonne. He was in the position to judge Marie Curie, but his daughter protected Madame Curie, which angered him. However, Marguerite said she would protect Marie no matter what happened and confronted her father. And Hertha invited Marie and her daughters in her house in England to hide them from media and let them rest fully. There was cooperation among feminists of the first wave of feminism. We also could say that things happened because the period was an era that

was full of hope.

In the end, Marie Curie was not fired. As for whether the extramarital affair was proven...it ended up a muddled solution. In any case, Langevin did not receive any social sanction. Having different treatments for each gender was definitely huge. Only women were accused in extramarital affairs and cornered to the point of losing their posts, in other words, their only ways to make a living.

Thus, there was severe gender segmentation. Yet, Marie Curie had survived in an all-male organization. It was unthinkable to achieve in previous eras. I think that it probably owes to the historical backdrop that the first wave of feminism became active and thus men and women who openly protected equal rights for women were properly appeared.

A happy story related to women's suffrage is when Marie Curie visited the US. The first visit was in 1921, just after American women obtained the right to vote. Marie visited the US twice, but she did not pay for the visits by herself—and neither the French government nor the US government were willing to provide any of the travel costs. It was an American women's association who raised the funds for her visits.

After Marie visited the US, the number of female students majoring

in science increased in the US. In fact, more female American students belonged to science departments at universities in the 1920s than in the 1950s. It is this era when Irène Curie ran for the Academy's membership and failed several times.

In the United States, women had just obtained the right to vote, and most women did not know even what they were capable of. It was unknown whether there was any actual job opportunity or any concrete place for women in society. There was few women who, like Marie Curie, could have become university professors, earned decent salaries, achieved some success, and at the same time, had receptive husbands, like Pierre. I believe that it was the first time women had hope. Women—from the first lady to ordinary people—made donations for Madame Curie. There was a strong bond between women.

The bond in the Radium Laboratory (where Marie was the head) was very strong. Marie accepted 45 women, including foreigners, in to her laboratory during her lifetime. Most of those women later played active roles in various fields, including science, in their own countries. They were proud of the period in which they lived as "pupils of Madame Curie." In short, to put it the other way, there were considerable number of women who thought to research science in "Madame Curie's laboratory" and families that wanted to "let their

daughter go to Madame Curie’s laboratory ".[10]

## 4 Things That Were Told Through the Career of Marie Curie

Among women scientists, Marie Curie looks like a star shining higher than anybody else in the sky—a solitary star. However, the bond among women who supported her was firm, and she had family ties. There were many distinguished women pupils. We can see that she never was actually a solitary person.

Back to the story at the beginning. Marie Curie had all the conditions that Atsuko Muraki—an exoneree—had.

The era was on Marie's side. She did not experience loss of time in the middle of her career as Toshiko Yuasa moaned about: "if these five years did not exist..." Of course, I would not say that Marie Curie had a life free from adversity. Born in occupied Poland is not a pleasant situation. It would be better for people not to have to face a reality in which their languages and/or religions are forced by others. However, we should not use this person to verify that adversity builds strength and character. Rather, I believe that—even in a time of adversity—the conditions that supported Muraki are what make people grow and improve, and Marie Curie is a very evidentiary person.

Please recall Toshiko Yuasa's statement in which she wondered to what extent people's capabilities could be improved by education. Seeing Marie's life from the perspective of education is, above all, the act of removing conditions that preclude natural expression and/or development of people's abilities and personalities as much as possible, enabling a suitable situation for improvement of each person's potential, I even think that Marie was in a good circumstance of which Yuasa thought as an ideal environment.

I also deeply felt that when we think about making full use of our own or other people’s abilities in society, we should be really careful about discourses that particularly praise hard-won achievements.

Marie Curie herself said a similar thing. It took four years for Mr and Mrs Curie, who worked in a horrible research facility, to isolate radium from a rock called pitchblende, and at that time, again, only the struggling hard-earned stories were covered by media. This story was used to demonstrate that, if a person is clever enough, the person can achieve great discoveries even if his/her laboratory is humble, so we need not put so much money into pure research.

Marie Curie became angry. She claimed if they had had plenty of manpower and a higher budget at that time, it could have been completed in two years. Because they did not have money and

manpower though, it took four years. However, her voice was hardly heard.

Environment is important for success. It is an inevitable truth, and where there is success, there is always a privileged environment. If a person is really isolated, both the person and his/her plan will collapse. Solitude and isolation are different. As for solitude, Marie experienced many lonely things: the death of her older sister and her mother as well as the death of her beloved husband. However, Marie had never truly been isolated in her life. If she had really been isolated, she could not have achieved such success. I believe that we should all be very careful about discourse that confuses these two elements—even if the person who said the discourse was Marie Curie.

There are many things those of us who live in the twenty-first century can learn from the life of Marie Curie, though she seemingly existed far from our lives. She was a genius scientist who was born in Warsaw some 100 years ago. Because I am a female university teacher, I consider things focused on education or women's social advancements, and I would like to stress that any situation that isolates a woman could never cultivate a woman's ability.

It is natural for humans to feel lonely or to struggle against difficulties or to make great efforts in their lives. However, isolation

with success does not exist anywhere. Marie Curie is good evidence of that. She succeeded because she was not isolated, and I believe that thinking about how important those supportive things were throughout her lifetime could provide the best window to consider our own situations.

While I was researching the life of Marie Curie, I keenly realized that the gender concept would be changed by area and time. The Polish gender concept, as well as those of the French or Russians at that time, was completely different. Also, as shown by the comparison of fashions in the eighteenth and nineteenth centuries, an ideal gender role was changed by time.

The same is true of the image of science. Sometimes it became a slogan for a nation; other times, it became a symbol of the wisdom of God. The value of science was also changed by this ethnic group. Furthermore, this "ethnic group" is also something that is not universal. The concept of "Polish people" in the era of Copernicus and "Polish people" in the era of Chopin are not same. In the era of Copernicus, there was no sense of ethnic group or nation in Poland. Polish people in the era of Chopin, or Marie Curie, on the other hand, had stronger ethic consciousness. When I saw the constant change of borders in this region, it made me wonder what the meaning of nations

actually meant. These are also things that would be dramatically changed by time and place.

Therefore, Marie Curie's success as a female scientist can be considered as follows: Her personal situation had always been linked to political matters of the time—"politics" here meaning so-called politics in extensive interpretation. In short, Marie was a typical example of the slogan of the second wave of feminism: "the personal is political," and such "politics" might lead Marie in the direction of success.

I am happy if Marie Curie's story can be viewed as an opportunity to make you think about events around you from a new perspective. Also, I want you to know that there are many female scientists in the real world, such as Toshiko Yuasa, who was said as Japanese Marie Curie, and Marie’s many female pupils who were active as scientists even after Marie's death. I am more than happy if my lecture becomes an opportunity for you to turn your attention to such points.

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[1] Toshiko Yuasa, *Pari Zuiso* (Eaay on Paris), Tokyo, Misuzu, 1973, p.60.

[2] The case of Yasuko Watanabe is one in which a woman who worked for Tokyo Electric Power Company was killed by an unknown assailant in a vacant apartment in Shibuya, Tokyo. The criminal is not yet unidentified. Since the victim moonlighted as a prostitute, the case was hugely covered and bloomed into a major scandal by mass media at that time. Atuko Muraki is a bureaucrat in the Ministry of Health, Labour, and Welfare and was arrested after the creation of a false official document in 2009. Muraki claimed the charges were false and was later found innocent and acquitted in 2010. Moreover, it turned out that it was an unjust accusation made by prosecutors, thus, the prosecutors' were said to be guilty.

[3] Minori Kitahara, *An'An no Sekkusu de Kireni Nareta?* (*Could You Become Beautiful by An-An's Feature on Sex?*), Tokyo, Asahi Shimbun Publications, Inc., 2011. pp. 206-207.

[4] Miwae Yamazaki, *Pari ni Ikita Kagakusya Yuasa Toshiko* (A Scientist Who Lived in Paris, Toshiko Yuasa), Tokyo, Iwanami, 2002. pp. 114-115.

[5] For Mireva Einstein, see Desanka Ttbuhivić-Gjurić and Werner G. Zimmerman (eds.), *Im Schatten Albert Einsteins*, 5. Aufl. Bern: Stuttgart, Wien, Haupt, 1993.

[6] To say it more precisely, Marie conducted this work with the cooperation of André Debierne who was an assistant of Pierre's. Debierne is also a discoverer of a new element: actinium.

[7] Pierre Curie, "Conférence Nobel," in Loïc Barbo, *Curie, Le rêve scientifique,* Paris, Belin, 1999. pp. 295-300.

[8] Claudia Clark, *Radium Girls.* Chapel Hill and London, Univ. of North Carolina Press, 1997.

[9] Jean-Marc Cosset and Renaud Huynh, *La fantastique histoire du Radium,* Renne, Editions Ouest-France, 2011.

[10] Natalie Pigeard-Micault, *Les femmes du laboratoire de marie Curie.* Paris, Glyphe, 2013.