The Discovery of X-rays: Turning Things Inside Out

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The discovery of X-rays was a major turning point in history because it helped to make medical diagnoses more accurate, airport security screening more efficient, and it has been used for non-destructive testing of materials. Doctors have used it to examine their patients, because they allow them to see inside a person. It has allowed security personnel to see the contents of bags, and other items. At first the use of X-rays for medicine produced minimal fear, but when people realized the dangers, even Thomas Edison was too scared to use it. But once safety measures were employed in 1974, X-rays started to be used in many different fields again.

William Roentgen was working in Wurzburg Germany in 1895 when he discovered X-rays. The story started when Phillip Lenard started his experiments with Cathode rays. After hearing about his experiments, Roentgen decided to do his own experiments with Cathode Rays. Roentgen was experimenting to see if Cathode Rays could travel through glass when he noticed a shimmery light on the table. Roentgen was working in a dark lab with no windows at that time, so there was no way the light could have been coming from an outside source. It could not be coming from the Cathode Rays because Cathode rays cannot go through the wall of the tube.

Roentgen did many more experiments, discovering that different amounts of lead affected the rays. He found out that the rays go through things, and called his wife down to help him experiment. He had her put her hand up in front of the tube. The
rays went through her hand, leaving a picture of her bones, and on her finger you could see her ring,¹ as I saw on the photograph Roentgen took with X-rays. He told one of his friends, Franz Exner, about his discovery, and consequently it got leaked. So Roentgen wrote an article for the "proceedings of the physical medical society" called "On a new kind of rays."

Roentgen's discovery was so big he received the first ever 'Nobel Peace Prize for Physics' in 1901. But unlike others who loved the fame that accompanied their discoveries, Roentgen hated it - he refused many titles, and only spoke about his discovery of x-rays in public once! He even got out of speaking at the Nobel Prize Ceremony by sneaking out of Sweden! Dr Hall Edwards was the first person to use X-rays for medical use, and it was to extract a needle from a woman's hand.

Believe it or not, Rontgen was not the first person to patent the X-ray tube. In fact, he never patented it at all! The first company to patent an X-ray tube was Siemens. 3 months after Rontgen's discovery, March 24, 1896, Siemens put out its patent for an X-ray tube.

At the same time, the Spanish-American War was being fought. And as the book, *The Use of The Rontgen Ray by the Medical Department of the United Sates Army in the War With Spain*, states, "The use of the Rontgen Ray has marked a distinct

advancement in military surgery." The X-rays allowed them to locate bullets easily, making surgery faster and more accurate, and helped avoid the infection that comes with using other tools.

X-rays were also used for non-destructive testing at the time, and still are. The X-rays could be used to check seams and look for other faults in the construction of items. Roentgen was the first to use it, and that was to check the seams of his gun. It has also been used for bigger projects, like checking the seams of the Trans-Andes-Pipeline. But they don't just use non-destructive testing for machinery. They use it for things like ancient mummies too, because mummy's disintegrate if opened. With X-rays, they can study the interior without harming the mummy. They can find out if the mummy had a disease when he was alive, or how he was mummified. X-rays can also be used to check art for forgery, if it is a student's copy, or to see if it has been painted over. They can tell if it is a copy by the technique and the layers. X-rays were also used to repair a broken sculpture, 'Archangel Gabriel's Annunciation to Maria', that fell in 1817. They used the X-rays to figure out which of the parts were missing, and replaced them.

Edison heard about Roentgen's experiments at the time, and decided to do some of his own, searching for items that become fluorescent under x-rays. He soon found out how exposure to x-rays can be dangerous, when his assistant, Dally started to be affected. Dally developed a skin cancer, and his left arm, and all his right fingers but his thumb

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2 The Use of The Rontgen Ray by the Medical Department of the United Sates Army in the War With Spain. N.p.: n.p., 1898.
had to be amputated. Dally was the victim to Edison's experiments. He was the one they tested the X-rays on. He ended up losing his hair from having his head exposed to X-rays, so that Edison could study that. Eventually, years after, Dally died from skin cancer. Edison also was affected by the X-rays-he came near to losing his sight! The result was that he was afraid of X-rays and refused to do anymore tests with them, as he stated in the newspaper New York World, "I am afraid of them. I stopped experimenting with them two years ago, when I came near to losing my eyesight and Dally, my assistant practically lost the use of both of his arms."³

Although Edison and his assistant Dally were affected by the rays, along with many other people, Roentgen was not hurt by them at all. It took him a year to do his experiments, and through that year he did not get one burn! But many other people did get harmed by the rays. Some died from exposure to the rays, some by touching the high voltage parts of the machine. Ultra violet light is what causes you to get sunburned, and X-rays are above ultraviolet light in the Electromagnetic Spectrum; they are even more powerful than ultraviolet light! So the burns you get from X-rays, are much more damaging than the sunburns you can get from going to the beach.

People didn't realize how harmful X-rays can be. They used it for things like checking if a shoe fit, exposing many people to radiation in one day. In 1974, safety regulations

were made to limit the amount of radiation released by X-rays. As it states in Code of Federal Regulations Title 21 "Radiation emitted from the cabinet X-ray system shall not exceed an exposure of 0.5 milliroentgen in one hour at any point five centimeters outside the external surface.

X-rays were such a big phenomenon that everyone used it in their advertisements. Just the mention of their product having something to do with X-rays made everyone want it! There were X-ray headache pills, X-ray stove cleaner, even X-ray golf balls! Everyone was talking about X-rays, people were even publishing poems on it. "The Roentgen Rays, the Roentgen Rays, What is this craze? The town’s ablaze, With the new phrase" one poem said describing exactly the hubbub X-rays caused. Most people thought X-rays were amazing, but some people thought they were a joke; "We do not want, like Dr. Swift, To take our flesh off and to pose in Our bones, or show each little rift And joint for you to poke your nose in." This poet expresses how he has no use for this discovery, and another points out, how is it going to help in the most important things, like, "when we ask our best girl to wed."

X-rays are used for many things nowadays - medicine, science, and security. For medicine, we use it to learn more about the body, and to help make diagnoses. From the earliest diagnoses, where it could help get a needle out of someone's hand, to now

4 Wilhelma, Electrical Review, April 17, 1896

5 Punch, January 25, 1896
6 Homer C. Bennett, American X-ray Journal, 1897
when it can help find a broken bone, or even a tumor. We use it in science to learn
more about the world, like the structure of crystals. We can use it for security, X-rays
can help identify dangerous items like guns and knives in baggage, and save many
people's lives.

The discovery of X-rays marked a turning point in the world. It helped save lives, but
it's also been the reason for people's death, like Edison's assistant Dally. The work of
one man affected so much. The discovery of X-rays has helped provide more efficient
ways to do things, and ways to look at something in depth without harming it.
Bibliography

Primary Sources

The Use of The Rontgen Ray by the Medical Department of the United States Army in the War With Spain. N.p.: n.p., 1898. Web.

This is a report written at the time, to show how X-rays were being used in the war.


This is the Safety Regulations for the use of X-rays, originally published in 1974.


This is a translation of the article Roentgen wrote for the 'Proceedings of the Physical Medical Society'


This is a newspaper from 1903 that talks about Edison's experiments, and his assistant's death, thanks to X-rays.

Secondary Sources


Used for information on Edison's assistant Dally, and how X-rays affected him.


Showed how X-rays were so big, people used it to advertise their products.

Gave good information about what set up the discovery of X-rays, and the after-effects.


This website was used to learn about the different uses of X-rays.


Give info on how X-rays were first used medically.


This gave information on the first patent of the X-ray tube.


This article had a good overview on the discovery of X-rays, and had a few things I hadn't heard other places.


This book gave a lot of good general information on Wilhelm Roentgen's life and the discovery of X-rays.


This is the museum guide for the Roentgen Museum.