

2014-12-17

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Hurst, E. "Radium dial workers: Radium as a health tonic, useful tool and deadly metal during the early 20th century". 9th Annual Students' Union Undergraduate Research Symposium, November 27, 2014. University of Calgary, Calgary, AB.

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Radium dial workers: radium as a health tonic, useful tool and deadly metal during the early 20th century

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Introduction

In early 1920's New Jersey USA, young, previously able bodied women began dying. Doctors were perplexed as to the cause and the realization that all these women worked at the same Orange New Jersey dial painting plant helped little in the way of explaining their gruesome symptoms. Their jaws and teeth would ache constantly; prompting tooth extraction, but the resultant open wound would not heal, eventually ulcerate and lead to necrosis of the entire lower jaw. In time, the jaw would disintegrate and need to be removed. Other common ailments observed in these young women included severe anemia, arthritic-like joint pain and spontaneous fracturing of the arms and legs.

At the dial painting plant the women meticulously applied radium-activated luminous paint to the dials of watches and clocks so that they could be seen in the dark. In order to be as detailed as possible the women created a fine brush point by placing the brush between their lips and twirling it. In doing so, the women consumed some of the paint and the constituent radium. It was eventually determined that the radium accumulated in the bones due to its chemical similarity to calcium, spurring widespread deleterious effects upon the body.

The cause of the women's ailments was hotly debated at the time. The sickness caused by radium did not occur immediately and most of the women no longer worked as dial painters when the physical manifestations began to show. The radium industry was wary of taking the blame for what would prove to be an occupational health disaster. Eventually, additional cases of radium linked illness in other dial painting plants would prove that the ailments were not unique to some unknown factor in the Orange NJ plant but rather radium ingestion itself.

Methods

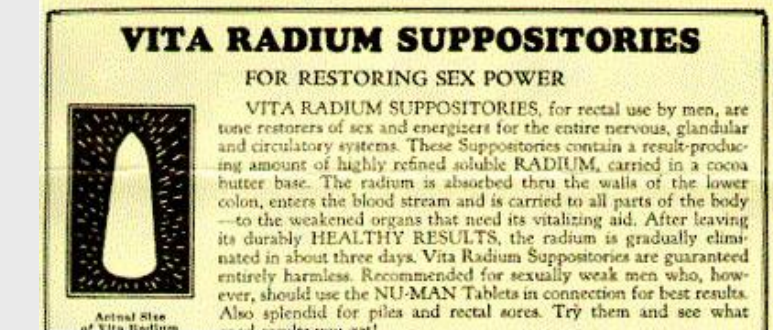
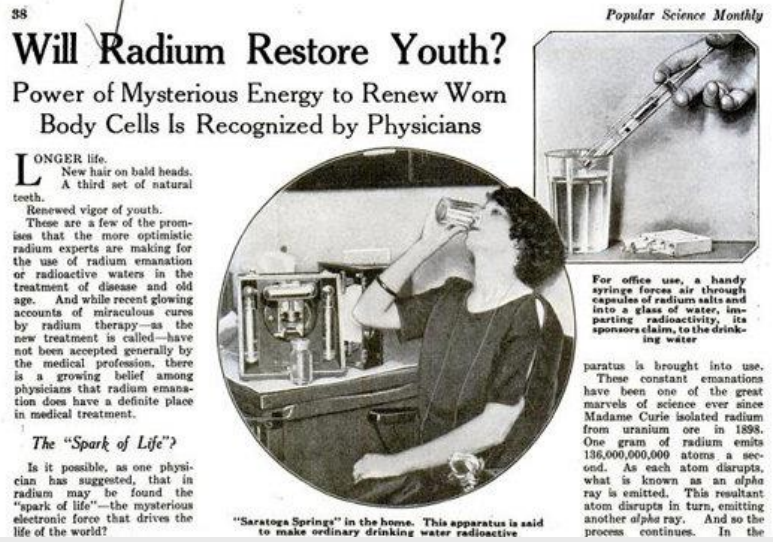
Conduct research into the radium dial worker tragedy in order to construct a historical case study for use in the classroom. Integrate ideas found in *Teaching the Nature of Science: Perspectives and Resources* so to create a learning tool that will meet the goal of teaching students about the nature of scientific discovery and understanding. Attend and participate in weekly meetings with project supervisors and other research assistants in order to discuss ideas pertaining to the historical case study, scientific content and our understanding of the nature of science.



"Poisoned as they chatted merrily at their work. Painting the luminous numbers on watches, the radium accumulated in their bodies, and without warning began to bombard and destroy teeth, jaws, and finger bones, marking fifty young factory girls for painful, lingering, but inevitable death." (From American Weekly, Sunday Newspaper insert, February 28, 1926, p. 11, Hearst Corporation.)



A dial painter suffering from radium-induced sarcoma of the chin



Various products containing radium, said to promote "good health"



What could be the cause of the physical ailments suffered by the dial painters?

Did the public perception of radium as a tonic for good health play a role in the unsafe use of radium in the dial painting factory?

Why didn't the dial painters know how dangerous radium could be?

Once scientists and those in the radium industry knew that radium could be dangerous why didn't they take measures to prevent excessive exposure and ingestion?

Can any parallels be drawn to other industrial health hazards?



Asbestos as a more recent industrial health hazard

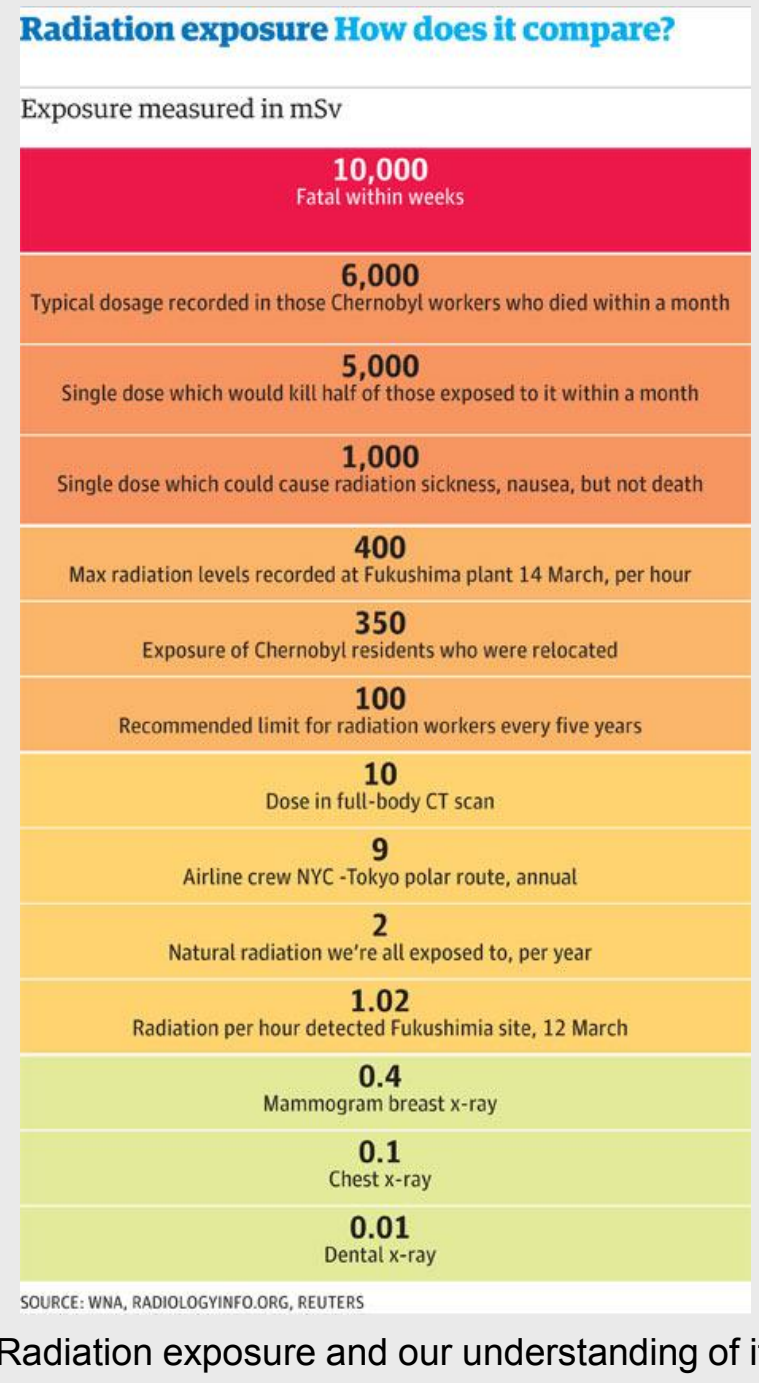


Mrs. Catherine Donahue lying on her couch after giving testimony. Donahue contracted radium poisoning while an employee of the Radium Dial Company in Ottawa, Illinois, and was part of the class action suit against the company.



1920's radium dial painting factory

What advancements in understanding followed the knowledge gained from the radium dial worker tragedy?



Radiation exposure and our understanding of it

Conclusion

In this project I set out to investigate the radium dial worker tragedy which took place in New Jersey during the 1920's as a historical case study to broadly explore the nature of science. At the same time I have developed a teaching tool that will explain the ways in which the discovery of radium and its industrial applications have far reaching implications in regards to medicine, workers' rights and industrial hygiene. The process of knowledge accumulation in the midst of the radium dial worker tragedy will act as the scaffolding for the students own learning trajectory and provoke them to question their knowledge base regarding scientific discovery and the process by which they acquire it.

Acknowledgement

I would like to thank Dr. Glenn Dolphin and Dr. Wendy Benoit for their wonderful support, guidance and feedback, Dr. Frank Stahnisch for believing in my abilities, my fellow research assistants Jessica Burylo and Simon Wiebe for their awesome ideas and friendship, and Dr. Douglas Allchin for showing me a new perspective on science education. Funding for this project was generously provided by the Taylor Family Foundation for Teaching and Learning, and the Tamarrat Professorship for Geoscience.

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