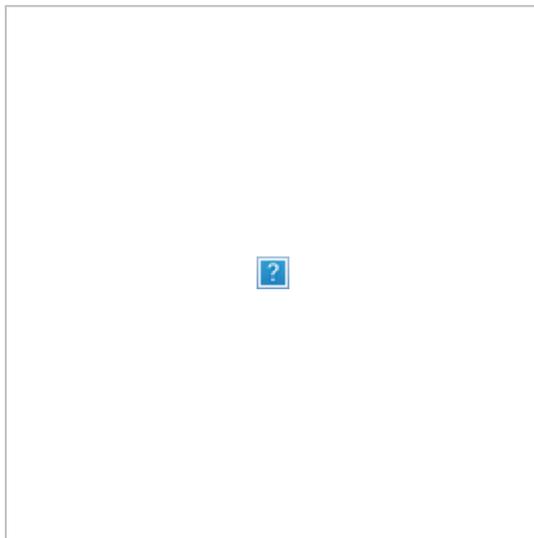


THE RADIUM GIRLS

AS WE ANALYZE and worry over radiation seeping from Japan's earthquake-damaged nuclear plants, it seems a curiosity that less than a hundred years ago, many people still believed that radioactive elements were the stuff of wonder. Of course, that changed in the horrific aftermath of the nuclear bombs the U.S. dropped on Japan in World War II. But there were warnings beforehand, small ones, really, canaries in the radioactive mines, if you will. The story I find most haunting is that of the Radium Girls, the young painters of luminous watch dials in the

*1920s. I told my version of their story in my book, *The Poisoner's Handbook*, but it's worth revisiting here. It remains a cautionary tale of radioactive elements, the slow recognition of their danger, and the risks of scientific over-confidence – that rings remarkably true today. Today's post is the first of three that I'll post in the next few days.*



Dial painters working at the U.S. Radium Corporation (Argonne National Laboratory)

The bones were five years old, slightly yellowed, with scraps of decayed tissue clinging to them. But the New Jersey

doctor who'd ordered the skeleton excavated thought they had a lethal story to tell, if he could only understand it. In 1928, he contacted the New York City Medical Examiner's office to find out if they could decipher the story in the bones. What he wondered – and no one had ever asked this before – was whether those aging bones might be radioactive?

To put that question in context, one had to look back some 30 years, to when scientists in France had announced a startling discovery, that the rocks of the Earth's crust were not all cold dead chunks of metal and mineral. Some were strangely alive; some sizzled with energy, even emitted radiation.

The French physicist Henri Becquerel reported the first such discovery in 1896. He'd found that the element uranium emitted atomic particles that could pass through metal foil, creating a spatter of light spots on photographic film. His work

ARE

SHARE
235

TWEET

PIN

COMMENT
0

EMAIL

MOST POPULAR



LONGREAD

John Arnold Made a Fortune at Enron. Now He's Declared War on I
01.22.17



SECURITY

Spoofed Grindr Account Turned One Man's Life a 'Living Hell'
19 HOURS



ARTIFICIAL INTELLIGEN

Inside Libratus, the Po AI That Out-Bluffed the Best Humans
3 HOURS

MORE STORIES

was taken up by newly married physicists, Pierre and Marie Curie, and two years later they reported their discovery of two new elements, both of which emitted particles at a greater rate than uranium. One they named polonium, after Marie Curie's native Poland. The second they simply named for radiation itself, calling it radium. They also proposed that elements like radium and polonium, with their peculiar atomic snap and sizzle, should be known as "radioactive" elements. All three scientists shared the 1903 Nobel Prize in Physics for this pioneering work.



Marie Curie (nobelprize.org)

It was radium - "my beautiful radium" as Marie called it - that seemed to embody the best, the most

promising of these new

materials. Polonium was too intensely active; it literally burned itself away within a year. Uranium was more stable but that was because it seemed less energized, leaking its radiation comparatively slowly. Radium, on the other hand, glowed with promise. It decayed slowly; its half-life was 1600 years, yet it spit and sparked with a steady release of energy. The Curies had measured radium's intensity at some 3,000 times that of uranium. It was rather like finding a tiny star buried in the dirt. A very tiny star – the Curies had isolated only 100 milligrams of pure radium from some three tons of uranium ore. But that only gave it the allure of something truly rare.



Within two years, physicians had learned that the application of radium salts to a tumor would shrink the cancer; “radium therapy” was introduced into hospitals shortly after the turn of the 20th century. Physicians reported what seemed to be miraculous healing effects, especially compared to the therapies of old. The newspapers compared radium’s magic to the golden healthful rays of the sun. Everyone wanted to stand in what seemed to be a naturally healing light.

There were bottles of radium water (guaranteed to make the drinker sparkle with energy), radium soda, radium

candy, radium-laced facial creams to rejuvenate the skin, radium-sprinkled face powder in four clearly labeled tints: white, natural, tan and African, soaps, pain-relieving liniments and lotions. Researchers discovered that the European hot springs, famed for their healing powers, contained radon, a gas that derived from the element uranium. Perhaps, scientists suggested, the health effects of the mineral hot springs came from radioactive elements in the ground around them; spas in upstate New York rushed to compete by dropping uranium ores into their swimming pools; a New Jersey company grew rich selling hundreds of thousands of bottles of “Radithor: Certified Radioactive Water” as a tonic that guaranteed new vigor and energy. Radiant Health, the ads proclaimed, beautiful skin, endless vigor, and eternal



health – ingesting radium seemed the next best thing to drinking sunlight.

The New Jersey physician, Harrison Martland, chief medical examiner of Essex County, had a different, less inspirational idea about radium. Of course, his first encounter with involved a rather mysterious health crisis arising at the U.S. Radium Corporation in Orange, N.J.

The corporation's success story began with the new technological demands of the Great War. Soldiers, huddled in the muddy trenches of Europe, learned quickly that the pocket-watches they carried were totally unsuited to the battlefields. The timepieces fell out of pockets, were crushed by the next crawling soldier, and if the watches somehow weren't smashed, they were hopelessly unreadable at night. Driven by military need, watch companies began putting watches on straps, which could be safely buckled on, and began looking for a

way to make watch faces glow in the dark.

Luckily, German scientists had developed a “self-luminous” paint some years before the war. This paint glowed due to a rather neat little cascade of chemical interactions: if radium salts were mixed with a zinc compound, particles emitted by the radium caused the zinc atoms to vibrate. The vibration created a buzz of energy, visible as a faint shiver of light. This pale greenish glow was easily outshone by daylight, but in the dark, it was just luminous enough to make an instrument readable without making it easily detectable by a watching enemy.



After American troops joined

the war in Europe, the factory in Orange, New Jersey won a contract to supply radium-dial instruments to the military. By the time the war ended, wristwatches with their glowing dials and handy wristbands were all the style. So were luminous-faced clocks, nicely dressed up in gold and ebony for elegant homes. The corporation's business was as healthy as ever, as healthy, you might say, as radium itself.

There was not a thought worth mentioning that radium might not really be the golden child of the elements.

At the factory, the dial painters were taught to shape their brushes to a fine point with their lips, producing the sharp tip needed to paint the tiny numbers and lines of watch dials, the lacy designs of fashionable clocks. Each worker was expected to paint 250 dials a day, five and a half days a week. They earned about \$20 a week for that work, at a rate of one and a half cents per completed dial.

The painters were teen-aged girls and young women who became friendly during the hours together and entertained themselves during by breaks by playing with the paint. They sprinkled the luminous liquid in their hair to make their curls twinkle in the dark. They brightened their fingernails with it. One girl covered her teeth to give herself a Cheshire cat smile when she went home at night.. None of them considered this risky behavior. Why would they when doctors were using the same material to cure people, when wealthy spa residents were paying good money to soak in the stuff, when the popular tonic Radithor was promoted by neighboring company? No one - certainly not the dial painters themselves - saw anything to worry about it.

Until, one by one, the dial painters began, mysteriously, to fall ill. Their teeth fell out, their mouths filled with sores, their jaws rotted, they wasted away, weakened by an

apparently unstoppable anemia. By 1924, nine of the dial painters were dead. They were all young women in their 20s, formerly healthy, with little in common except for those hours they spent, sitting at their iron-and-wood desks at the factory, painting tiny bright numbers on delicate instruments.

Those bones, the ones that Harrison Martland had sent for a radioactivity check? To bring the story full forward from those heady days of discovery in France, those bones belonged to a dial painter from Orange, New Jersey.

Continued tomorrow.