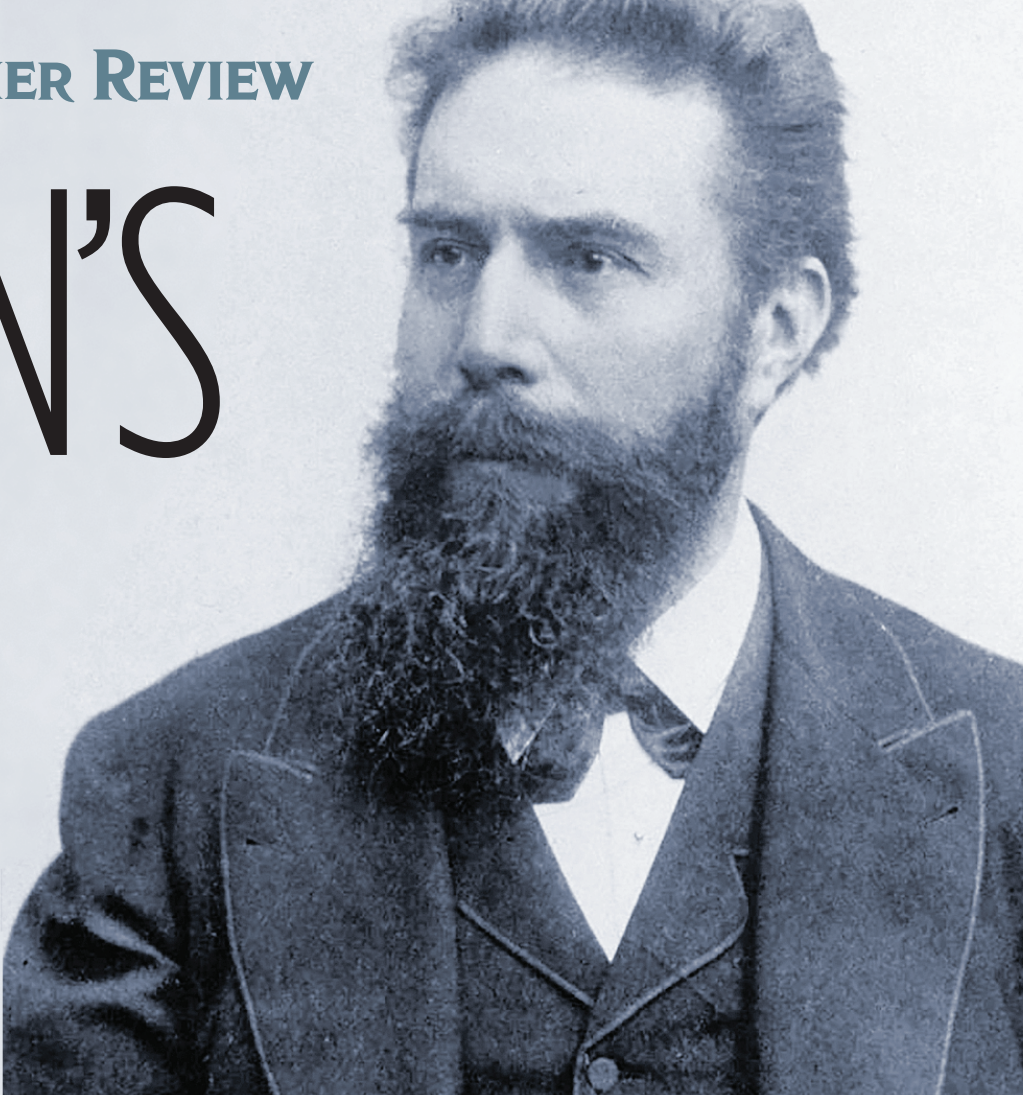


RÖNTGEN'S RAYS

By Charles Apple
THE SPOKESMAN-REVIEW



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X-Rays are the amazing bits of the electro-magnetic spectrum that allow us to see through many objects — including human soft tissue.

But when they were first publicly demonstrated on Jan. 23, 1896 — 130 years ago — no one knew quite what they were or exactly how or why they worked.

THE ACCIDENTAL DISCOVERY OF X-RAYS

Wilhelm Röntgen was an experimental physicist and chair of the physics department at the University of Würzburg — one of Germany's oldest and most-respected institutions.

In 1895, Röntgen was experimenting in his darkened laboratory with the effects of passing an electric discharge through various types of vacuum tubes: glass bulbs with positive and negative electrodes, evacuated of air.

On Nov. 8, 1895, he noticed that not only was the gas in the tube glowing, but a fluorescent glow also appeared on a nearby chemically-coated screen.

"And what did you think?" a reporter later asked him. "I did not think; I investigated," Röntgen replied.

Röntgen decided the glow was caused by cathode rays. Because of all the unknowns about them, Röntgen called them X-rays. For the next several weeks, Röntgen worked alone in his lab to pursued the matter. He found the X-rays passed through various objects — tinfoil, rubber sheets, wooden boards, a double pack of cards, a 1,000-page book — and lit up the screen. One of the few materials he found that *didn't* let X-rays pass: lead.

He also found that X-rays could also penetrate flesh: They could pass through soft tissue but not bones. Struck by this, he aimed his X-ray emitter at a photographic plate and, on Dec. 22, 1895, talked his wife, Anna Bertha, into placing her hand in front of it.

Mrs. Röntgen was stunned by the resulting



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A Crookes tube similar to the one with which Röntgen was experimenting when he discovered X-rays.



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Röntgen's first "medical" X-ray photo was of his wife's hand, but, one month later ...



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... Röntgen photographed a colleague's hand in a public demonstration.

image of her finger bones and her wedding ring. "I have seen my death," she told her husband.

Six days later, on Dec. 28, Röntgen's first paper about his discovery — "Über eine neue Art von Strahlen," or "On a New Kind of Rays" — was published in the Proceedings of the Würzburg Physico-Medical Society. Nine days after that — on Jan. 5, 1896 — an Austrian newspaper reported his discovery.

On Jan. 23 — just 11 weeks after his discovery — Röntgen made a public presentation to the Würzburg Physico-Medical Society. During that lecture, he demonstrated X-rays by duplicating the experiment he had done with his wife: In front of his audience, he made an X-ray plate of the hand of one of the anatomists in attendance, Albert von Kölliker.

Von Kölliker joined with the scientists who were suggesting the new phenomena be called "Röntgen's Rays." Most folks continued to call them "X-rays." Today, in German and a number of other languages in Central and Eastern Europe, X-rays are called Röntgen's Rays and the medical photos that are made with X-rays are called "Röntgenograms."

Röntgen also declined to patent his discovery, saying he wanted society to benefit from X-rays. In 1901, Röntgen would be awarded the first Nobel Prize in Physics. He declined to give a Nobel lecture.

Röntgen and his wife planned to immigrate to the United States but were prevented when World War I broke out. He died of colorectal cancer in 1923 at the age of 77.

X-RAYS 'GO VIRAL'

The exhaustive test results Röntgen wrote and spoke about were easily reproduced by other scientists. Some, like Nikola Tesla, not only produced their own X-rays but also began experimenting with X-ray photography.

Scientists began X-raying all sorts of things: mummies, fossils, frogs and insects and weapons, for example. By February 1896, Dr. John Hall-Edwards of Birmingham, England, was using X-rays as an aid in surgical procedures.

The science community enthusiastically accepted X-ray technology, even before it was fully under-

stood. In 1896 alone, a Röntgen biographer estimated that more than 49 essays and 1,044 articles were published about X-rays, their nature and their use.

The general public, too, became fascinated with X-rays and possibilities of using X-rays in medicine. But there were some who viewed the new technology with skepticism.

Some, in the Victorian age, felt threatened by these high-tech beams that could allow users to see through objects, much of the human body and, yes, clothing.

A London firm developed lead-lined



This sketch is a reproduction of the original picture of two ladies shadowgraphed by the aid of Professor Roentgen's X Rays. One of these ladies wore a dress lined with TEXTILE-BUCKSKIN, which is impervious to the cathode rays.

TORONTO GLOBE

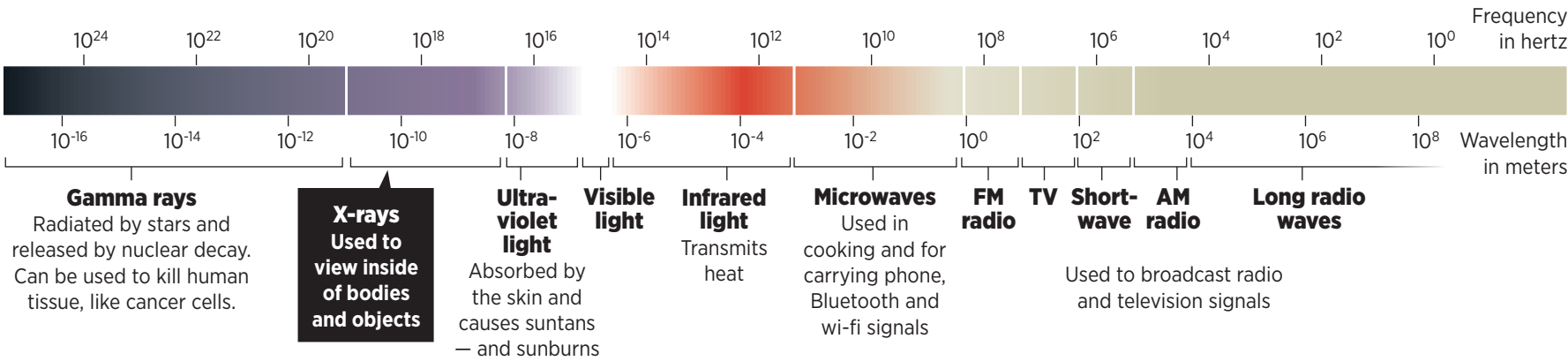
underwear, which it claimed was "X-ray-proof underclothing" that would allow ladies of the day to protect their modesty.

X-ray portraits were offered to those who had money to spend. X-ray machines were installed in shoe stores to help clerks find just the right fit for their customers.

It wasn't long, though, that some who worked with X-rays began experiencing health issues. In 1904, one of Thomas Edison's assistants died of skin cancer. This prompted Edison to discontinue his work with X-rays.

THE ELECTROMAGNETIC SPECTRUM

In 1895, there were many other scientists experimenting with cathode rays. Undoubtedly, some had already produced X-rays. But Röntgen was the first to notice them. Röntgen work on X-rays was so thorough that no significant new physical properties of X-rays were discovered until 1912, when Max von Laue found they were similar to light waves except with wavelengths so short that they were invisible to the human eye.



Sources: "100 Great Scientists Who Changed the World" by John Balchin, "How Technology Works" by Dorling Kindersley, "Smithsonian Times of Science" edited by Robert Winston et. al., "I Used to Know That: Science" by Marianne Taylor, the Nobel Prize, the American Physical Society, Irving Medical Center of Columbia University, National Museum of Health and Medicine, the Canadian Medical Association Journal, Science Museum Group, PBS News, History.com