

# Remembering X-rays

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On the evening of 8 November 1895, Wilhelm Conrad Röntgen immediately recognized a remarkable new phenomenon. Fluorescent material lying on a bench some distance from the cathode ray tube with which he was experimenting lit up in his darkened laboratory. Like many others around the world, he was studying the beam of electrons emanating from the cathode in a low-pressure gas discharge (1). The electron beam could emerge from the thin window of the tube, where its range was a few millimeters, but fluorescence at a substantial distance was most surprising.

In fact, the fluorescence was not caused by electrons but by an entirely new form of radiation. Röntgen, 50 years old, and professor of physics at the University of Würzburg, went to work on this phenomenon with great intensity. He told no one about it until 22 December, when he told his wife and made the famous x-ray photograph of her hand. During the 7 weeks that followed his initial discovery, he did many careful experiments and wrote the results in the paper "Eine Neue Art von Strahlen" (1), calling the new radiation X-rays. He submitted it to the *Sitzungsberichte der Physikalischen-medizinischen Gesellschaft zu Würzburg* on 28 December, and within 4 days received printed copies of the publication. Röntgen refused to patent x-rays, preferring to put his discovery into the public domain for all to benefit. And indeed, the imagination of the public was captured by the ability to see bones in a living person and its obvi-

ous potential applicability to medical diagnosis (2).

On 23 January, at his first and only public lecture on the discovery, Röntgen made an x-ray picture of the hand of Dr. Albert von Kölliker, who in turn suggested that the new phenomenon be called Röntgen rays, the name used to this day in much of the world. The first attempt to treat cancer with x-rays was reported to have been carried out by E. H. Grubbe in Chicago on 29 January. The idea of using the technique to search baggage was put forward in a cartoon by the French *Journal La Nature* in May. At the same time, the harmful effects of the radiation became manifest very rapidly, with numerous injuries resulting from an almost complete lack of concern.

In 1896, Nobel prizes did not yet exist. However, when the prizes were first awarded 5 years later, Röntgen was the recipient in physics. Even today, 100 years after the discovery, we see continuing developments in x-ray sources (third-generation synchrotrons, x-ray lasers, and so on), as well as optical elements and detectors. These devices are opening up new fields in areas from microscopy to astronomy, from micromachining to the study of the dynamics of biological macromolecules. And so, this week we celebrate the centenary of a truly singular event in the history of science.

## References

1. W. Röntgen, "Eine neue Art von Strahlen" (1895) [English transl., *Nature* **53**, 274 (1896); *Science* **3**, 227 (1896)].
2. O. Glasser, *Wilhelm Conrad Röntgen and the Early History of X-rays* (Thomas, Springfield, IL, 1934). For a modern perspective, see R. F. Mould, *A Century of X-rays and Radioactivity in Medicine* (Institute of Physics, Bristol, UK, 1993).

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