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Discovery of X-Ray and Details

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Editor Note on X-Rays

Before their discovery in 1895, X-rays were just a type of unidentified radiation emanating from experimental discharge tubes. They were noticed by scientists investigating cathode rays produced by such tubes, which are energetic electron beams that were first observed in 1869. Many of the early Crookes tubes (invented around 1875) undoubtedly radiated X-rays, because early researchers noticed effects that were attributable to them, as detailed below. Crookes tubes created free electrons by ionization of the residual air in the tube by a high DC voltage of anywhere between a few kilovolts and 100 kV. This voltage accelerated the electrons coming from the cathode to a high enough velocity that they created X-rays when they struck the anode or the glass wall of the tube.

The earliest experimenter thought to have (unknowingly) produced X-rays was actuary William Morgan. In 1785 he presented a paper to the Royal Society of London describing the effects of passing electrical currents through a partially evacuated glass tube, producing a glow created by X-rays. This work was further explored by Humphrey Davy and his assistant Michael Faraday.

Advances in Radiology

Taking an X-ray image with early Crookes tube apparatus, late 1800s.The Crookes tube is visible in centre. The standing man is viewing his hand with a fluoroscope screen. The seated man is taking a radiograph of his hand by placing it on a photographic plate. No precautions against radiation exposure are taken; its hazards were not known at the time.

Surgical removal of a bullet whose location was diagnosed with X-rays (see inset) in 1897

Rontgen immediately noticed X-rays could have medical applications. Along with his 28 December Physical-Medical Society submission he sent a letter to physicians he knew around Europe (January 1, 1896) News (and the creation of "shadow grams") spread rapidly with Scottish electrical engineer Alan Archibald Campbell-Swinton being the first after Rontgen to create an X-ray (of a hand). Through February there were 46 experimenters taking up the technique in North America alone.

The first use of X-rays under clinical conditions was by John Hall-Edwards in Birmingham, England on 11 January 1896, when he radiographed a needle stuck in the hand of an associate. On February 14, 1896 Hall-Edwards was also the first to use X-rays in a surgical operation In early 1896, several weeks after Rontgen's discovery, Ivan Romanovich Tarkhanov irradiated frogs and insects with X-rays, concluding that the rays "not only photograph, but also affect the living function".

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