

A review of radiology and Nobel Prizes

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“To live for a time close to great minds is the best kind of education,” from Memory Hold-the-Door, the 1940 autobiography of writer, historian and politician John Buchan.

The city of Stockholm, land of the great playwright Strindberg and the influential film director Ingmar Bergman, is perhaps better associated today with Nobel Prizes, as part of the legacy of one of Sweden's most famous sons and the inventor of dynamite Alfred Nobel (1833-1896). Nobel was a brilliant inventor and very successful businessman. But, being unlucky in love he never married and having no heir he left his vast fortune, over £200 million in today's money, to fund prizes honouring the great achievements of his fellow men, enabling his name to be remembered in perpetuity from 1901 onwards. In the beginning the subjects considered for prizes were physics, chemistry, medicine or physiology, and literature and peace (awarded in Oslo). Economics joined the select pantheon in 1969.

Stockholm City Hall is an iconic emblem of this Scandinavian city, a venue that hosts the annual Nobel banquet for 1,500 guests in December in the presence of the Swedish monarch. The city is also home to The Nobel Museum, which opened in 2001 and is housed in the 200-year-old stock exchange building, overlooking the city's oldest cobbled square – the Stortorget in the Gamla Stan (or old town). In the museum café one can sit on the chairs that were sat on and signed by past Laureates. If only such intelligence could be transmitted via chairs. The first floor of this building is the home of the Swedish Academy, which decides the literature prize annually in October. The world famous Karolinska Institute is involved with the selection of the medicine prize, while the Swedish Academy of Sciences is involved in the selection of the physics and chemistry prizes.

The museum has information pertaining to all the past Nobel Laureates (there are currently over 900 members of this very distinguished club), telling us a little about their lives and what they were awarded the prize for. There are also regular exhibits (including one on Marie Curie's experiments) and interactive displays. The museum will be relocated in the future to a larger building housing a bigger meeting room and better facilities. The venue also hosts a library of books pertaining to the lives of the Laureates.

As part of International Radiology Day celebrations on November 8, I thought it would be nice to reflect on the pioneers in the field of radiology who have been awarded this great honour.

Wilhelm Röntgen (1845-1923), whose discovery is commemorated on that day, was the first recipient of the physics prize in 1901. The story of his great experiment on the afternoon of November 8, 1895, is well chronicled and thrust the relatively unknown professor of physics from Wurzburg, Germany, into the limelight. His paper 'On a new kind of ray' changed the world and led to the birth of the science of radiology, which revolutionised medical practice over 100 years ago.

In 1903 the physics prize was shared between Antoine Henri Becquerel (1852-1908) and Pierre (1859-1906) and Marie (1867-1934) Curie. French physicist Becquerel discovered radioactivity in 1896, upon realising that uranium produced this radioactivity spontaneously. The Curies discovered that polonium and radium were also radioactive elements. Their story is well chronicled in biographies and even in film: The 1943 Mervyn LeRoy black and white film *Madam Curie*, with Greer Garson as Curie, is one of cinema's classic biopics.

Marie Curie became the first female professor at the University of Paris in 1906 following the tragic death of her husband in an accident, and she went on to win another prize in chemistry in 1911. During WWI she was involved in creating the earliest mobile field radiography units, having converted ambulances for this purpose, and became one of the pioneers of early military radiology. Her daughter Irene (1897-1956) ably helped her in these endeavours. Irene and her husband Frederic Joliot Curie (1900-1958) went on to win a chemistry Nobel Prize in 1935 for their work on artificial radioactivity. Irene was to die at age 58 from leukaemia.

In the field of cardiac imaging, we must not forget the contributions of Werner Forsmann (1904-1979), a maverick physician from the small town of Eberswalde, Germany, who in 1929 performed a cardiac catheterisation on himself, following a long line of self-experimenters such as the great British physiologist Sir Joseph Barcroft. His boss was not impressed and sacked him, so Forsmann had to switch careers. Forsmann had the last laugh, however, as the Nobel committee realised the injustice and Forsmann shared the 1956 Nobel Prize in Medicine for his contribution to cardiac catheterisation with Cournand and Richards.

In 1979 British inventor Godfrey Hounsfield (1919-2004) from EMI was awarded the Nobel Prize in Medicine for his work on the CT scanner, along with Allan Cormack (1924-1998). Hounsfield, an electrical engineer, never went to university and started work on radars and computers. He built the first prototype CT scanner, which soon found a medical use in 1971. The mathematical principles were independently worked out by South African physicist Cormack. CT scanning was to revolutionise the way medicine was practised and today we cannot imagine a hospital without this machine – a machine that enables us to look inside the body in detail like never before. Hounsfield was showered with honours but essentially remained a modest, shy bachelor, and seemed not to be affected by the fame and spotlight.

In 2003 Peter Mansfield (1933-2017), a physics professor from Nottingham, shared the Nobel Prize in Medicine with Paul Lauterbur (1929-2007) from the USA. Mansfield's 1962 thesis was entitled 'Proton magnetic relaxation in solids by transient methods'. The research of these pioneers enabled the mathematical data to be transformed into an image, thus enabling the birth of magnetic resonance imaging of patients. An American chemistry professor, Lauterbur made major contributions in this field. The scientific basis of MRI had been developed by Bloch and Purcell, who won the physics Nobel Prize in 1952. The 2003 prize caused much controversy as Damadian from the USA had not been included for his work in the field.

Many made great contributions to imaging but were not awarded a Nobel Prize, for example the pioneers in ultrasound.

This summary would not be complete without a mention of medical physicist Sir Joseph Rotblat (1908-2005) and the 1995 Nobel Peace Prize for Rotblat's work for global peace with the Pugwash conferences and vociferous criticism and campaigning against the nuclear arms race. As a young man Rotblat had signed the Russell-Einstein manifesto in 1955 (Einstein incidentally won the physics prize in 1921 for his work on the photoelectric effect, which is an important concept for radiologists, while the brilliant British mathematician, logician, philosopher, writer and pacifist Bertrand Russell won the literature prize in 1950).

This article is not intended to be comprehensive and more detail can be found in the references. All the discoveries were often co-dependent on other people and on previous discoveries, with a considerable cross-fertilisation of ideas between different disciplines. Discoveries often occur by complete chance, or due to paradigm shifts in thinking, to quote Thomas Kuhn the scientific philosopher. We should perhaps reflect on the words of the famous 12th century French philosopher Bernard of Chartres: "We are dwarves perched on the shoulder of giants," and this applies to all of us today just as much as when the words were uttered.

Images of Nobel, Curie, Röntgen, Becquerel and Rotblat all sourced from Wikimedia Commons.



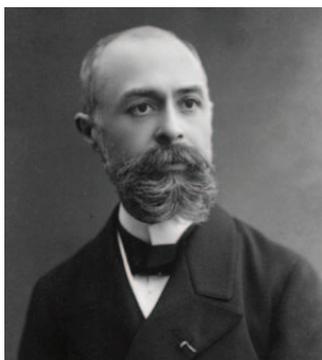
Alfred Nobel.



Marie Curie.



Wilhelm Röntgen.



Antoine Henri Becquerel.



Josef Rotblat.

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Stockholm City Hall (above) and The Nobel Museum (below).

