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# Inside Story: The genius of Rutherford revisited

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In the December 2008 issue of ***CERN Courier***, Cecilia Jarlskog delved into the Nobel Archives at the Royal Swedish Academy of Sciences to learn more about why Ernest Rutherford didn't receive a second Nobel Prize. In research for my book on Rutherford, I had access not only to the Nobel Archives but also to Rutherford's papers and other archives, which cast further light on this topic. From these I was also able to correct some common misconceptions about the young Rutherford, not least from Arthur Eve's excellent first official biography, published in 1937. For example, in the first nine lines of the first paragraph in Eve's book there are seven errors or points that need explanation.


Rutherford

Eve knew Rutherford from when he was a distinguished scientist until his death, and he was guilty – as are so many since – of wrongly projecting Rutherford's genius back into his childhood. As Jarlskog quotes, Eve wrote that Rutherford "had no difficulty in obtaining scholarships and prizes"; my own research found the truth to be quite the contrary.

The reality is that Rutherford in essence took two attempts at any scholarship he ever gained: from primary school to secondary school (and had Edward Paisley not crashed in English, Rutherford would never have received that one); from secondary school to the University of New Zealand (on his first attempt in 1888 he passed matriculation but did not come high enough on the list for a scholarship, so he stayed an extra year at school for another attempt); and from university to an overseas scholarship (he was ranked second of the two candidates who applied for the nomination to the sole biennial Exhibition of 1851 Science Scholarship available to New Zealand graduates, but the top candidate withdrew, leaving Rutherford's the only nomination for 1895).

It is true that Rutherford received the undergraduate maths prize every year while at Canterbury College. However, in his first year he shared it with Willie Marris (a classicist and later governor of Assam). In the second and third years he was beaten by, and then equal with, Marris. The prize was awarded to Rutherford because a student could hold only one scholarship and Marris also won the classics scholarship, which he elected to keep. It should not be overlooked that there were only four or five candidates each year in mathematics with honours. In summary, Rutherford obtained his early prizes and scholarships through hard work and perseverance, not from natural brilliance.

### The missing second Nobel

When it comes to a second Nobel Prize, Rutherford made several discoveries and inventions that, had they been his only discovery, would have made him a serious candidate. For example, on arrival at Manchester, Rutherford, an expert in the conduction of electricity in gases, needed a less tiresome method of recording alpha particles. So with the help of the excellent assistant whom he had inherited, Hans Geiger, he developed the Rutherford–Geiger detector, which with later minor modifications became the Geiger–Müller tube. There have been nine Nobel Prizes awarded for detectors of ionizing rays and particles, but there has never been one for the first detector to record arrivals permanently – which became the oldest type still used in everyday service.

Some 26 Nobel Prizes have been awarded for the discovery of, or theories linking, subatomic and subnuclear particles. This began with the electron but there was never one for the nuclear atom or the proton. The Nobel Committee thought that Niels Bohr, who got his start in Rutherford's lab and placed the electrons around Rutherford's nuclear atom, had made the bigger advance. Had Rutherford not already received a Nobel Prize, it would have been appropriate that he and Bohr shared one.

There were five Nobel Prizes awarded for inducing nuclear reactions (induced radioactivity, neutron activation, fission, the accelerator and transuranics), but there was never one for the first induced nuclear reaction, when Rutherford did so using alpha particles in 1918. Put another way, it is curious that there was never a Nobel Prize for the world's first successful alchemist – Rutherford changed nitrogen into oxygen, which was an endeavour that had eluded chemists for centuries.

There are several other examples of work that deserved, but failed, to win a second Nobel Prize. The Nobel Archives explain why. After the 1908 prize, Rutherford's later discoveries and the elite positions that he occupied meant that a second prize would not have enhanced his already great fame. As the eulogy in the ***New York Times*** more eloquently stated: "It is given to but few men to achieve immortality, still less to achieve Olympian rank, during their own lifetime. Lord Rutherford achieved both. In a generation that witnessed one of the greatest revolutions in the entire history of science, he was universally acknowledged as the leading explorer of the vast infinitely complex universe within the atom, a universe that he was first to penetrate."

## About the author

John Campbell, University of Canterbury, is the author of ***Rutherford Scientist Supreme*** (AAS Publications 1999) and www.rutherford.org.nz, and producer of an upcoming documentary, ***Rutherford***.