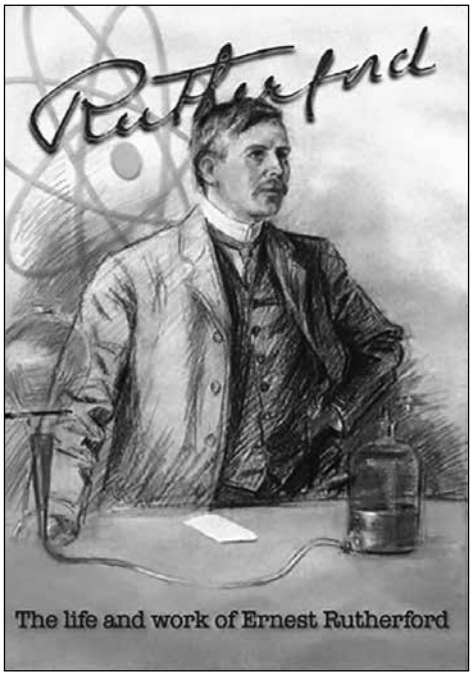
*DVD Review*

**Gillian Ashurst and John Campbell**

# Rutherford, the Life and Work, on DVD




## Reviewed by John Clare

This DVD presents a necessarily much-condensed version of John Campbell's 500-page biography of Ernest Rutherford[1]. That book is both very readable and a highly-acclaimed and major work of scholarship based on material from a large number of archives, selected, assessed and placed in context by a professional physicist over a period of two decades. Likewise, the DVD draws on photos, documents and some visual recordings from many archives in Europe, North America, Australia and New Zealand.

The presentation is primarily an account of Rutherford's life and work fleshed out with re-enactments of significant events, some archived film material, recent interviews with leading physicists and extensive and innovative use of contemporary photographs and documents. The result is thus a biography that is more of a documentary in its nature than a conventional cinematographic film but is so well constructed that it compels attention to at least the same and probably a greater degree than a film. The DVD contains three episodes, each of about sixty minutes, and each divided into ten to twelve chapters. Each part may be viewed by chapter or as a seamless whole.

[1] *Rutherford Scientist Supreme,* John Campbell, AAS Publications, 1999, PO Box 31-035, Christchurch, New Zealand.

The first part covers childhood and schooling, six undergraduate and research years at Canterbury University College and three years at the Cavendish Laboratory in Cambridge, working under J J Thompson. Some 60–70% of the narration in this part is carried by a professional narrator but any likelihood of monotony is avoided by the use of Campbell and others including Gerry Gilmore of the Institute of Astronomy at Cambridge University. Campbell is at pains to demolish the myth that Rutherford was head-and-shoulders more able than his childhood or university-student contemporaries: on the contrary he failed at his first attempt to get a scholarship that would take him to Nelson College (without it he would not have got any secondary-school education); he had to repeat his final year at Nelson College to get a University Junior Scholarship that would provide the support without which university would have been out of reach; and he was second choice for the 1851 Exhibition scholarship that enabled him to study overseas, winning it only after the first choice married and chose to take a secure job in Auckland. This part is largely biographical with only 20–30% given over to explanations of the devices he constructed for measuring the magnetic properties of iron, the investigation at
Cambridge of emissions from discharges in rarefied gases and cathode rays, Becquerel's X-rays and Rutherford's α and β rays.

The second part covers his nine years at McGill and twelve at Manchester. It was in these years that he made his three most significant achievements:

- radioactivity was realised to be a process of spontaneous transmutation of one element to another, statistical in nature and independent of temperature, pressure and other environmental factors,
- he deduced that almost all the mass of the atom was concentrated in a very small, positively-charged nucleus – the Rutherford atom, and
- he demonstrated that a transmutation of elements could be induced by firing one nucleus at another, in the first instance by firing α particles from a radioactive source at nitrogen nuclei.

In this part the audio-visual presentation makes plain how much more effective the use of drawings and other visual effects can be, compared with a written description, when explaining complex physical processes and apparatus. In this second part, discussion of Rutherford's science and biographical material are about equally balanced, with Tony Whitehead, a McGill University chemist, and Larry Badash, an American historian, contributing much of the evaluation of Rutherford's work.

The third part spans the nineteen years of Rutherford's leadership of the Cavendish Laboratory up until his untimely death in 1937. In contrast to the McGill and earlier Manchester years, where he was very much a hands-on experimentalist, Rutherford is now active as a mentor, leader, and fundraiser whilst still generating research directions and assisting with the interpretation of results. This period marks the beginnings of 'big science': the Cockcroft-Walton particle accelerator and the high magnetic field machines that Kapitza was constructing. It is notable for Chadwick's discovery of the neutron, whose existence Rutherford had proposed a decade earlier, and for the confirmation of the mass-energy relation in the interaction of protons with lithium to produce two α particles. Rutherford now has the standing, public reputation and network of contacts that enable him to contribute effectively to public affairs, not only as an advocate for scientific research (e.g. in support of establishing the DSIR in New Zealand) but also through the Academic Assistance Council to assist and support academics displaced by Hitler's policies.

This DVD is busy in the sense that information and impressions are presented at a high rate. In particular in the third part presentations by six or eight scientists explaining various facets of the story, some of whom had worked with Rutherford and provide reminiscences of those days when the Cavendish was the world centre of nuclear science. The sound track is enhanced by the use of student songs (the words can be found in the book) to accompany the credits concluding each part as well as the rendition in the first part of songs written and set to popular tunes for disruptive use at Canterbury College capping ceremonies. It is interesting to compare these with the decorum of today's functions.

Taken on its own this DVD is an excellent introduction to Rutherford's life and work. Viewed with or after reading the book, it imparts, through the diversity of presenters and visual material, a much more vivid impression of the times than the written text can.

**How to obtain this DVD**

In New Zealand (NZ$40 including delivery).

(a) Post cash or a cheque made out to JEMBCA to The Rutherford Documentary, PO Box 31-035, Christchurch 8444.

(b) If direct credit banking is preferred, email rutherforddvd@ask-a-scientist.net for details.

An NTSC version for Canada, USA, Japan, etc. is also available.

Please make it clear if you want that version.

NTSC plays on PAL DVD players but not the other way round.

For other countries, email rutherforddvd@ask-a-scientist.net for details of cost and delivery, etc.

An eight minute trailer can be viewed at rttp://www.rutherford.org.nz under DVD/Books.