

Welcome to the Magnificent Women's Trail at the Science Museum.

*This trail reveals the stories of famous **women who changed the world**, guiding you through objects in our galleries that are linked to their achievements.*

LEVEL 0

ENERGY HALL

RACHEL PARSONS – PARSONS ENGINE

Sir Charles Parsons was a famous British engineer based in Newcastle upon Tyne and best known for developing the steam turbine. His wife Katharine (Lady Parsons) and daughter Rachel were engineers too, but they were also advocates for women's employment rights and founders of the Women's Engineering Society in Britain in 1919.

In 1910 Rachel Parsons was one of the first three women to study mechanical sciences at the University of Cambridge, although because she was a woman she was not allowed to graduate with a degree. When the First World War broke out she replaced her brother as a director on the board of their father's steam turbine company, and recruited and trained women to replace the men who had left for war. She became a leading member of the National Council of Women, and campaigned for equal access for all to technical schools and colleges, regardless of gender.

EXPLORING SPACE

LISA RUFFA – CROPS IN SPACE (PHOTOGRAPH)

Research technician Lisa Ruffa is shown here working with wheat, carrying out the ground testing for the first plants to be sent into space.

Researchers wanted to find ways to grow plants for astronauts to eat when on long-duration spaceflights. The first plants reached the International Space Station in 2001. Since 2003 Russian cosmonauts have been eating half of their crop of red romaine lettuce, while the other half goes towards further research.

MAKING THE MODERN WORLD

BEATRICE SHILLING – MERLIN ENGINE

Beatrice (Tilly) Shilling is best known for her work on the Merlin engine that powered the Spitfire aircraft during the Second World War. The aircraft had a problem: its engine stalled when pilots dived, so they could not keep up with (or get away from) enemy fighter pilots. Shilling developed a special valve for the engine which solved this problem.



HERTHA AYRTON – ARC LAMPS

Hertha Ayrton, born in 1854, carried out important studies in electrical engineering and physics, and championed women's entry into scientific institutions. Ayrton's work on the physics of electric arcs helped to improve understanding of these powerful lighting systems and so led to practical improvements in street lighting. Her studies of waves in water explained the formation of sand ripples. She also developed several inventions, including anti-aircraft searchlight technology for the Admiralty and the 'Ayrton fan' for dispelling poison gas in the trenches of the First World War.

In 1899 Ayrton became the first female member of the Institution of Electrical Engineers. She was proposed for Fellowship of the Royal Society in 1902, but at the time married women had no legal status, rendering her ineligible. However, she did become the first woman to read her own paper at a Royal Society meeting, in 1904, and was the first woman to be awarded the society's Hughes Medal, in 1906. A strong supporter of the suffragist movement, she helped to found the International Federation of University Women and the National Union of Scientific Workers.

THE MUNITION GIRLS – PAINTING

This painting, by Stanhope Alexander Forbes (1918), shows female workers making shells at the Kilnhurst steelworks in Rotherham, England.

Like many other steelworks, this factory was converted to make shells and ammunition for the war effort. As men volunteered or were called up to fight in the British Army, women became the main work force in industry and farming, with over 1.5 million working in such factories during the First World War. At the end of the war the government made it illegal for them to continue working in these factories and they were forced to leave the workforce.

Munitions workers could often be picked out in a crowd because of the distinctive yellow colouring of their hair and skin caused by the sulphur used in production. They were nicknamed 'canaries'.

The painting was commissioned specifically to commemorate the women workers, and each of them received a framed copy of it.



ROSALIND FRANKLIN – STRUCTURE OF DNA MODEL

Rosalind Franklin is best known for her pictures of DNA – the genetic building blocks of life. Using X-ray crystallography she famously produced the image that came to be known as ‘Photo 51’, which led to the discovery of the structure of DNA by James Watson and Francis Crick in 1953. The image showed evidence that DNA had a double-helix structure, and was the information needed by Watson and Crick to build their famous model of DNA. Although her work on coal and viruses was appreciated in her lifetime, her contributions to the discovery of the structure of DNA were largely recognised only after her death in 1958.



MARIE SKŁODOWSKA CURIE – X-RAY MACHINE

Marie Skłodowska Curie was the first woman to win a Nobel Prize, the first person to win one twice, and the only person to win a Nobel Prize in two different sciences (physics and chemistry). She was born in Poland in 1867 and spent her life doing pioneering research into radioactivity, the process by which atoms decay. Her achievements included developing a theory of radioactivity (as well as coining the term) and the discovery of two elements, polonium and radium. She was also the first woman to become a professor at the University of Paris. During the First World War she used her knowledge of X-rays to develop mobile X-ray units for field hospitals.

DOROTHY HODGKIN – STRUCTURE OF PENICILLIN AND INSULIN

Dorothy Crowfoot Hodgkin was a British chemist who won the Nobel Prize in Chemistry in 1964. She was the third woman to win this prize, after Marie Skłodowska Curie and her daughter Irène Joliot-Curie. Hodgkin used X-ray crystallography to explore the structure of molecules. Through this method she helped uncover the structure of penicillin and other important complex biological molecular structures, including insulin and vitamin B12. Her work has led to a better understanding of how our bodies function.

Hodgkin travelled widely and was a strong supporter of scientists in developing countries, especially in China and India. She campaigned for nuclear disarmament and was president of the Pugwash conferences on science and world affairs.

In 1976 she became the first woman to receive the Royal Society’s Copley Medal. She was awarded the Order of Merit in 1965.

LEVEL 2



INFORMATION AGE

ADA LOVELACE – COMPUTER VISIONARY

Ada Lovelace’s insightful work on calculating machines anticipated the possibilities of the computer age. Born in 1815, Lovelace was an English mathematician who worked with Charles Babbage on the future possibilities of computing – a vision 100 years ahead of the computer age. She was inspired by Babbage’s analytical engine and published her thoughts on the machine’s possibilities beyond the manipulation of numbers to the representation of abstract ideas

Daughter of the poet Lord Byron and the education reform campaigner Annabella Milbanke, Lovelace had an unconventional life for a woman in the 19th century. Thanks to her mother, she gained a scientific education and introductions to some of the most significant thinkers of the day. She died young at 36, but her achievements are still celebrated widely on Ada Lovelace Day, which falls in October.

LEVEL 3



FLIGHT

AMY JOHNSON – RECORD-BREAKING PILOT OF ‘JASON’

Born in Hull, Amy Johnson trained as an engineer with the de Havilland aircraft company in London. In 1929 she was the first woman to receive a licensed engineer’s certificate from the Air Ministry. In 1930 she became the first woman to fly solo from England to Australia, setting out from Croydon airfield in her Gipsy Moth light biplane, ‘Jason’. Although bad weather and fuel shortages during various legs sabotaged her dreams of breaking light-aeroplane speed records, she met with global media interest on landing at Port Darwin. Subsequent record-breaking flights to Japan, South Africa and India cemented her celebrity.

During the Second World War Johnson flew for the Air Transport Auxiliary. Aged 37, she was killed in 1941 when her plane was lost over the Thames Estuary in fog.



The Magnificent Women’s Trail has been compiled by the **Women in Materials** group of the **Institute of Materials, Minerals and Mining** in celebration of International Women in Engineering Day on 23 June 2018.

For more information about Women in Materials visit www.iom3.org/WIM