

The Marconi connection

He may not have had the originality of Einstein, but we still owe Marconi a huge debt for his intuition, finds **Andrew Robinson**

Marconi: The man who networked the world by Marc Raboy, Oxford University Press, £25
Museum of the History of Science, Oxford: Director's Choice by Silke Ackermann, Scala Arts, £9.95

AT GUGLIELMO MARCONI's grand state funeral in Rome in 1937 – orchestrated with military-style pomp by the black-shirted Benito Mussolini – the largest wreath on the hearse, adorned with a Nazi swastika, was sent by Adolf Hitler.

As the funeral began (6 pm precisely, Rome time, on 21 July), telegraph and radio stations in Italy, the UK, the US and Canada fell silent. As did the 31 beam and wireless stations of Cable and Wireless's global network, and others in China, Japan, the Middle East and Europe.

Everyone knows that Marconi was the main pioneer of wireless communication. Yet we are far less confident about just which parts of this invention were his own work, in contrast with the inventions of near-contemporary, Thomas Edison. Now, at long last, we are offered a clearer picture in *Marconi: The man who networked the world*, a deeply researched and almost all-encompassing biography by Canadian media studies academic, Marc Raboy.

Fascinating and influential though Marconi was, the man who emerges does not inspire warmth, either in Raboy or, perhaps, in most readers of his notably balanced book. As Marconi remarked in 1934 in an

exchange with the principal of the University of St Andrews, UK, after the students elected him lord rector: "Have I done the world good, or have I added a menace?"

Radio transmission is one of the great inventions of all time. But in Raboy's view, "Marconi's greatest invention was himself". Most of his massive biography is therefore devoted not to wireless science and technology per se but to its profound ramifications for national and international business and politics, and for the complicated identity of Marconi.

He was a man full of inner dissatisfaction, a womaniser with generally troubled personal relationships, including a failed marriage. Among men, Marconi "didn't really have friends, only associates", remarks Raboy. By contrast, "He courted women who challenged him but married two who would never have dreamed of doing so." Raboy concludes: "Something was missing... perhaps a result of his mother's unconditional devotion; he always, painfully, sought and was never able to find that in a companion."

A permanent outsider who longed to belong, Marconi was born in Italy in 1874 to an Italian Catholic father and an Irish Protestant mother, made his name and fortune in imperialist Britain at the turn of the century, and became a visiting celebrity in the US and Canada. He eventually returned to Italy to embrace Mussolini and Italian fascism,



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including the attack on what is now Ethiopia in 1935, when Marconi offered to serve in Africa. In his later years, he spent much time on the yacht he bought in 1919: a floating lab he named Eletttra, after *electrum*: the Latin for amber, which creates a spark when rubbed.

In the mid-1920s, Marconi's company started short-wave radio transmissions using the so-called Marconi beam system. These rapidly supplanted the cabled telegraphy introduced in 1830s, and led to the global connection

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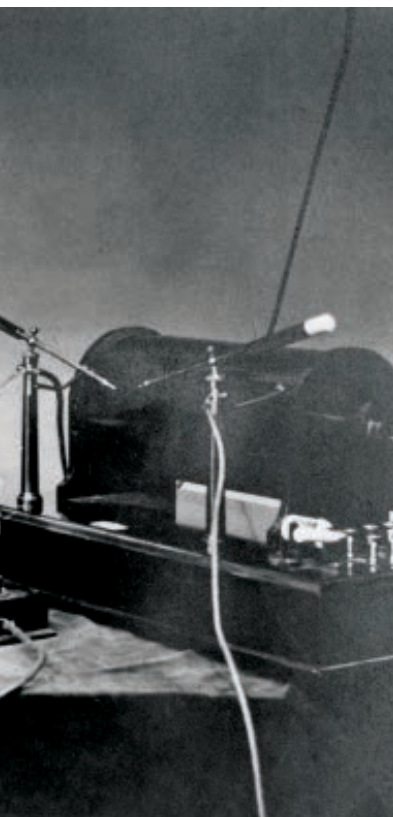
we take for granted in our mobile telephony and the internet. The beam concept was Marconi's, but its key technology was an antenna designed by Charles Franklin, his employee, close colleague and collaborator, who went on to

design the antenna for the first BBC television transmission in 1936.

After Marconi's death, Franklin wrote of his boss with a mixture of respect and criticism: "His scientific knowledge was weak, his engineering knowledge was weak, but he had a damned lot of intuition and common sense. He may have initiated the beam system but he didn't know a thing about it."

Franklin's analysis certainly applies to the most famous episode of Marconi's tumultuous career. It was 1901 and Marconi was in Newfoundland, waiting for a signal to cross the Atlantic from a spark transmitter in Cornwall, UK.

At that time, physicists were convinced by the electromagnetic theory of James Clerk Maxwell and unaware of the existence of the reflecting ionosphere. They were sure that such long-distance atmospheric transmission was impossible because all electromagnetic waves travelled



Marconi followed his intuition rather than scientific formality

in straight lines, like light beams, and could not bend to follow Earth's curvature. Marconi ignored conventional wisdom and ploughed on with his experiment. As Raboy writes, his "tinkerer's experience... made it happen by following hunch and intuition rather than scientific theory".

But, as with his later beam system, a crucial element in Marconi's 1901 equipment was not his invention: the sensitive detector known as a coherer. Originally conceived by French physicist Edouard Branly in 1890, Marconi's 1901 coherer was created by an Italian collaborator, Luigi Solari. He apparently based it on an unpatented mercury-based design by Indian physicist Jagadish Chandra Bose, published in the *Proceedings of the Royal Society* in 1899: a borrowing never acknowledged by the notoriously litigious Marconi and neglected,

surprisingly, by Raboy.

Marconi's very first coherer, undoubtedly based on Branly's, caused a sensation when he demonstrated it in public lectures by William Preece, the engineer-in-chief of Britain's Post Office in 1896-1897. Concealed in a black box with an electric bell on top, the coherer could receive a signal from a spark transmitter that rang the bell, no matter where Marconi placed the black box, and without any visible connection between transmitter and box. There was immediate talk of "magic", and comparisons with illusionist Harry Houdini. Even the University of Oxford called Marconi a "magician" in a speech conferring an honorary degree on him in 1904.

The coherer, now in the extensive Marconi collection at the Museum of the History of Science in Oxford, is reproduced in a new, superbly photographed guide to the museum. It is one of 35 intriguing objects taken from the museum's collections, appealingly described by its director, Silke Ackermann.

These objects range from a metal astrolabe constructed by Muhammad Muqim al-Yazdi for Shah Abbas II of Persia in 1648 to a paper "photogenic drawing" John Herschel made in 1839 and a flask of penicillin culture made by one of its developers, Howard Florey, around 1940 – plus a blackboard chalked by Albert Einstein in Oxford in 1931.

Marconi's coherer certainly ranks with astrolabes, photography and penicillin. But as portrayed by Raboy, the man seems to me much closer in intellect and personality to, say, Steve Jobs than to Einstein. Despite Marconi's limited original contribution to technology and science, we shall always owe him an enormous debt for his vision of universal communication. n

Andrew Robinson's latest book is *Einstein: A hundred years of relativity*, Princeton University Press

Shiver our timbers!

Henry VIII's favourite warship lives, thanks to 21st-century tech, finds **Chris Simms**

The Mary Rose Museum, Portsmouth, UK

THE watch bell rings out amid the hubbub of the ship. Sailors work on deck; the barber-surgeon yanks a tooth; men cook for their 500 shipmates. As the enemy approaches, everything changes: cannons are primed, archers loose arrows. The 16th-century warship is alive in a way it hasn't been since it sank in 1545, battling the French.

On view again after a six-month hiatus, the Mary Rose is now lit with CGI vignettes. Move along glass-panelled viewing platforms parallel to the remaining half of the ship and sound effects change to match the videos. Thousands of preserved objects from Henry VIII's favourite warship also give us an unrivalled look at Tudor life.

But it is much more than that. The fact we can now see it close up and breathe the air surrounding its ancient timbers is a testament to an epic conservation effort dating back to 1982 when the ship was raised from the Solent.

Mary Rose 2016: CGI, sound effects and timber smells bring it to life



STEPHEN FOOT/COURTESY OF THE MARY ROSE TRUST

Waterlogged and home to marine bacteria and fungi, if the ship dried too fast, it would crack and collapse, so for 12 years it was sprayed with chilled water. Then, from 1994 to 2013, it was doused with polyethylene glycol, while a biocide killed bacteria and fungi. So why does the ship look so dry now? Since 2013, dehumidifiers have sucked tonnes of water from the hull, bringing it to a stable state that should last many years.

Look carefully and you may see signs of another conservation battle: yellowish traces of iron and sulphur in the wood. The ship was held together by iron nails and wooden pegs. The nails rusted, forming iron oxides. When the ship was below the sea, anaerobic bacteria used this oxidation for energy, producing hydrogen sulphide, which is acidic in water, further weakening the timbers. Hence why the frame supporting the hull is titanium not iron.

The Mary Rose is not just a Tudor time capsule. It was crewed by microbes and skeletons for 437 years, and has been out of the water for as long as it sailed. Its voyage is still going on. n