

Hertha Marks Ayrton

Crasher of Boys Clubs, Maker of (Electrical) Waves

Jack McGuinn, Senior Editor

She was born Phoebe Sarah Marks April 28, 1854 in Portsea, Portsmouth, Hampshire, UK—the third child of a Polish-Jewish watchmaker named Levi Marks and Alice Theresa Moss, a seamstress. Her father died in 1861, leaving Sarah's mother with seven children—and another on the way—and Sarah with shared responsibility for caring for the children.

But after that—it was clear the decks and give this woman—to become known as Hertha Ayrton (in what could be construed as a cagey career move, she married her professor)—a wide berth.

Marks was a British engineer, mathematician, physicist, inventor and non-stop energy force. And something else—self-proclaimed agnostic. Known today as Hertha Ayrton, she dropped her given name and adopted the name “Hertha,” after the eponymous heroine of a Swinburne poem criticizing organized religion. Perhaps her ultimate achievement—or recognition, certainly—was winning the highly coveted Hughes Medal by the British Royal Society for her work with electric arcs and ripples in sand and water; as of 2015 Hertha remains the first of only two women medalists.

Hertha Marks Ayrton

At age nine—in a decidedly Dickensian scenario—Hertha went to live with two aunts, who also ran a school in London. She was soon introduced to the math-and-science, STEM-type subjects of the day; by 16 she was working as a governess.

Hertha attended Girton College, University of Cambridge to study mathematics. George Eliot (Mary Ann Evans for the non-English Lit majors among us) endorsed Ayrton's application.

While at Cambridge Ayrton built a sphygmomanometer, led the choral society, helped start a math club, and *founded the Girton fire brigade*. In 1880, although demonstrably qualified, Cambridge did not confer an academic degree because Cambridge conferred only certificates—not full degrees—to women. Not to be deterred, Ayrton in 1881 passed exams at the University of London that led to a Bachelor of Science degree.

Upon returning to London, Ayrton made her way by teaching and embroidery, running a club for working girls, and caring for her invalid sister. She also taught at Notting Hill and Ealing High School.

Ayrton's first patent was awarded in 1884—a line-divider—or engineering drawing instrument—for dividing a line into any number of equal parts and for enlarging and reducing figures. Hertha went on to register 26 patents, including 13 on arc lamps and electrodes, and 8 devoted to air propulsion power.

In 1884 Hertha attended “night school” classes on electric-

ity presented by Professor William Edward Ayrton, a pioneer in electrical engineering and physics and a fellow of the Royal Society. As mentioned, they married the following year, she becoming his assistant with his experiments. Meanwhile, Hertha began her own investigation into the characteristics of the electric arc. In the late nineteenth century electric arc lighting was everywhere, but its tendency to flicker and hiss had been a major problem.

Hertha in 1895 began a series of articles for the *Electrician*, theorizing that these arc lighting issues were caused by oxygen exposed to the carbon rods used to create the arc. And, in 1899, she was the first woman allowed to present her own paper before the Institution of Electrical Engineers (IEE)—“The Hissing of the Electric Arc.” Hertha was subsequently elected the first female member of the IEE; the next to be admitted would be in 1958. Several years later, Hertha petitioned to present a paper before the Royal Society, and again was thwarted. The ground-breaking work—“The Mechanism of the Electric Arc”—was instead presented in 1901 by noted electrical engineer John Perry.

Thus by the late nineteenth century Ayrton's work was recognized more widely. Hertha published *The Electric Arc*, a summary of her research and work on the electric arc, in 1902, further validating her place among her male “peers” as a serious contributor to electrical engineering.

Or did it?

Hertha in fact continued to be spurned by the traditional scientific societies of her day. After the 1902 publication of *The Electric Arc*, Hertha was proposed as a Fellow of the Royal Society by Perry; her application was refused on grounds that married women were not eligible. Hertha persevered and in 1904 became the first woman to present before the Society, reading her paper “The Origin and Growth of Ripple Marks,” which was subsequently published in the *Proceedings of the Royal Society*—yet another first for the feisty feminist.

Sadly, this woman of science, now an acknowledged giant in her field, was stricken with blood poisoning. She died in 1923. (Source: Wikipedia) **PTE**

