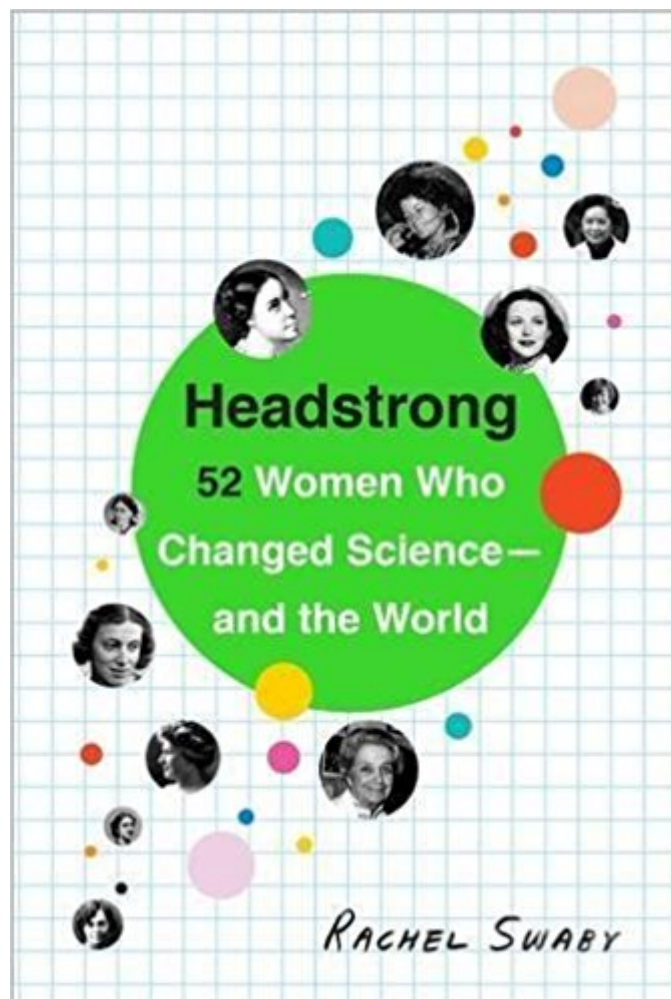




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# Headstrong: 52 Women Who Changed Science—and The World



## Synopsis

Fifty-two inspiring and insightful profiles of history's brightest female scientists. In 2013, the *New York Times* published an obituary for Yvonne Brill. It began: "She made a mean beef stroganoff, followed her husband from job to job, and took eight years off from work to raise three children." It wasn't until the second paragraph that readers discovered why the *Times* had devoted several hundred words to her life: Brill was a brilliant rocket scientist who invented a propulsion system to keep communications satellites in orbit, and had recently been awarded the National Medal of Technology and Innovation. Among the questions the obituary—and consequent outcry—prompted were, Who are the role models for today's female scientists, and where can we find the stories that cast them in their true light? *Headstrong* delivers a powerful, global, and engaging response. Covering Nobel Prize winners and major innovators, as well as lesser-known but hugely significant scientists who influence our every day, Rachel Swaby's vibrant profiles span centuries of courageous thinkers and illustrate how each one's ideas developed, from their first moment of scientific engagement through the research and discovery for which they're best known. This fascinating tour reveals 52 women at their best—while encouraging and inspiring a new generation of girls to put on their lab coats.

## Book Information

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## Customer Reviews

"Swaby tells the scientists' stories with energy and clarity. Refreshingly, spouses and children are mentioned only when relevant—and the book is recipe-free." —*New York Times Book Review*

"A corrective—a spur to change—| Swaby's subjects are all worthy women who

deserve more publicity.ââ "Wall Street Journal" collection of brisk, bright biographies.ââ "The Washington Post" Rachel Swaby's no-nonsense and needed Headstrong dynamically profiles historically overlooked female visionaries in science, technology, engineering, and math.ââ "Elle" A woman revolutionized heart surgery. A woman created the standard test given to all newborns to determine their health. A woman was responsible for some of the earliest treatments of previously terminal cancers. We shouldn't need to be reminded of their names, but we do. With a deft touch, Rachel Swaby has assembled an inspiring collection of some of the central figures in twentieth century science. Headstrong is an eye-opening, much-needed exploration of the names history would do well to remember, and Swaby is a masterful guide through their stories."

"Maria Konnikova, Contributing New Yorker" writer and New York Times bestselling author of Mastermind: How to Think Like Sherlock Holmes "Rachel Swaby's fine, smart look at women in science is a much-needed corrective to the record" a deftly balanced field guide to the overlooked (Hilde Mangold), the marginalized (Rosalind Franklin), the unexpected (Hedy Lamarr), the pioneering (Ada Lovelace), and the still-controversial (Rachel Carson). Swaby reminds us that science, like the rest of life, is a team sport played by both genders.ââ "William Souder, author of On a Farther Shore and Under a Wild Sky" "Headstrong is a true gem. So many amazing women have had an incredible impact on STEM fields, and this book gives clear, concise, easy-to-digest histories of 52 of them" there's no longer an excuse for not being familiar with our math and science heroines. Thank you, Rachel!"

"Danica McKellar, actress and New York Times bestselling author of Math Doesn't Suck" Swaby's exuberant portrayals make this a compulsively readable title. There is no good reason why every single woman here is not a household name, and now, thankfully, Swaby is helping rectify history's oversight.ââ "Booklist" Swaby celebrates barrier-breaking titans | [and] has collected an inspiration master list of women in science with accessible explanations of their work.ââ "Publishers Weekly" Although many of these women may not be familiar names outside their courses of study, the author's spadework should bring them to the forefront, allowing the general public to learn about the females who pushed beyond sexist attitudes to undertake and achieve success in a male-dominated arena. These short accounts should inspire girls who want to study science to follow their dreams | succinct and informative.ââ "Kirkus Reviews" "[W]omen just don't get the encouragement they need and deserve to pursue careers in science. Here's a handy book to help encourage young women to put themselves on the scitech path, with profiles of 52 women from Nobel Prize winners to major innovators and more who have made a difference in science."

"Library Journal

Rachel Swaby is a freelance journalist. Her work has appeared in the *Runner's World*, *Wired*, *O, The Oprah Magazine*, *New Yorker.com*, *Afar*, and others. She is a senior editor at *Longshot* magazine, the editor-in-chief of *The Connective: Issue 1*, a former research editor at *Wired*, and a past presenter at *Pop-Up* magazine. She lives in Brooklyn. [www.rachelswaby.com](http://www.rachelswaby.com)

The pivotal line of this book is delivered by Hertha Ayrton, who was a scientist, an author, a close friend of Marie Curie, and the inventor of a fan that dispersed noxious gas away from soldiers. She is quoted as saying: "Personally I do not agree with sex being brought into science at all. The idea of 'women and science' is entirely irrelevant. Either a woman is a good scientist or she is not; in any case she should be given opportunities, and her work should be studied from the scientific, not the sex, point of view." This is the standard of measure of all the women in the book *Headstrong* by Rachel Swaby. In this work, Swaby covers the lives and contributions of 52 women in varying branches of science including invention, physics, mathematics, biology, chemistry, and more. Why 52? Swaby reasons that there are 52 weeks in a year, and so in reading this book you can learn about a different female scientist each week. Each selection is just a snapshot of their life and their lasting impact to human progress and innovation. Some of these portraits are only two pages long; the longest is only about 5 pages. Although each segment is brief, the value of having so many different contributions by women compiled together effectively drives home the point of the impact women have made to the umbrella of science area which they fall under and upon the larger world. The work is fact-filled, interesting, full of trivia, and delivers strong evidence of the value of female scientists without harping on or getting lost in hot-button issues like male dominance in science and exclusion of women in the field. The book deals in facts, and these include the struggles women had to go to in obtaining education and standing in their passions within fields where they were the glaring minority. My favorite profiles included those of Gerty Radnitz Cori, a Biochemistry scientist responsible for our understanding of glycogen; Virginia Apgar, who developed a test to establish newborn health standards; Marry Anning, a pioneer in paleontology and fossil discovery; Tilly Edinger, a Jewish woman who encountered Nazi targeting in establishing paleoneurology; Rachel Carson, the voice behind environmental awareness and author of "Silent Spring"

Do you already know that, during the last 100 years or so, many of the most important

breakthroughs in science were achieved or led by women? Frankly, I did not until reading this book in which Rachel Swaby provides mini-profiles of 52 truly exceptional scientists in seven fields: medicine, biology and the environment, genetics and development, physics, Earth and stars, mathematics and technology, and invention. By the way, all of them are women. When examining the list, I did recognize the names of several, notably Jane Wright, Rachel Carson, Barbara McClintock, Irene Joliot-Curie, Sally Ride, Ada Lovelace, and Hedy Lamarr. With regard to Lamarr, born Hedwig Eva Kiesler in Vienna in 1914, she was among the most popular film stars in the 1930s through the 1950s but, as Swaby points out, she and George Antheil developed a frequency-hopping technology that was a much better way to guide torpedoes. "Lamarr's ideas paved the way for a myriad of technologies, including wireless cash registers, bar code readers, and home control systems, to name a few. While she had a long career as a celebrated actress, Lamarr finally got the full recognition she deserved when she was awarded the Electronic Frontier Foundation's Pioneer Award in 1997. Her response: 'It's about time.'" Of course, her contributions during World War Two were classified and her key insight was not revealed until 1976 -- "thirty-five years after Lamarr patented it." Here's a representative selection, a "sampler," of biographical details among those of greatest interest to me:

- o Charlotte Auerbach (1899-1994) realized that, to understand a gene, she needed to understand its mutation. "Just a few mustard-gas burns and some lab work later, and Auerbach was at the top of the field, the so-called mother of mutagenesis."
- o Anne McLaren (1927-2007) not only proved in vitro fertilization was possible, "but years later, she was also responsible for safely and ethically guiding it into the world."
- o Marguerite Perey was the first woman elected to the French Academy of Sciences (before Madame Curie) in recognition of her development of a new radioactive element, #87, that "filled an empty square in the periodic table's alkali metal group, and completed the table's spaces for naturally occurring elements."
- o Chien-Shung Wu (1912-1997): When the results of her experiments in radioactivity to coax the K-meson into an observable state were announced, "an article in the New York Post gushed, 'This small modest woman was powerful enough to do what armies can never accomplish: she helped destroy a law of nature.'"
- o Ada Lovelace (1815-1852) was the daughter of Lord Byron and received what was in her time a superb education. Her research notes helped Charles Babbage to develop his "Difference Engine" and then his "Analytical Engine," providing what amounts to programming code for two of the earliest computers.
- o Stephanie Kwolek (1923-2014): Her preparation of the cold-spun threads (kevlar, developed in the DuPont labs) "launched a brand-new area of research around liquid crystalline polymers."

Throughout the history of science, most breakthroughs have been the result of cross-functional, often cross-generational collaboration. The

52 scientists on whom Swaby focuses would be among the first to acknowledge the value of what they learned from others as well as the value of what their associates contributed to the given process eventual success, to reveal, for example, the complex structures of biochemical substances (Dorothy Crowfoot Hodgkin) or to calm the temperament of the arc light (Hertha Ayrton). Rachel Swaby urges her reader to learn about those whose research "jump-started the Environmental Protection Agency, who discovered the wrinkle-free cotton, and even those whose ingenious score has now saved generations of struggling newborns." If you are a young woman who aspires to gain an education and then pursue a career in one of the STEM disciplines or is now embarked upon that journey, I urge you to read and then re-read this book and leave the final comment in this brief commentary to one of my personal heroines, Helen Keller: ""Life is either a daring adventure or nothing."

I absolutely loved this book. As soon as I started reading, I could not put it down. It is one of the most informative, enjoyable, and inspiring books that I have read in a very long time! I congratulate the author for such fine work!

A great book and a quick read. Should be apart of any family's library. Great reference book to start any project from Women in history to doing a science project on any of the women in the book.

Bought two of these two years in a row for two sets of girls who won scholarships to attend week long science camp. I was inspired. The girls have reported back that they were inspired, too.

Great to read for a young woman in science. Only warn that it could make people in science feel like underachievers compared to the brilliant women mentioned in this book who managed to do some impressive work despite constantly facing the problem of being the "wrong" gender.

Sent as a gift. Was requested by the recipient. I assume she likes it.

I bought this book as a gift, but picked it up several times to read various stories covered in the book. The more I read, the more pleased I was that I made the purchase. Discovered quite a few facts I was not aware of. I hope the recipient enjoys it as much as I did.

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