

Marcia Barbosa

# A secret history

**Out of the Shadows: Contributions of Twentieth-Century Women to Physics**

Nina Byers and Gary Williams (ed)  
2006 Cambridge University Press  
498pp  
£30.00/\$35.00hb

Why have there been so few female Nobel laureates in science – and just two in physics? The usual retort is to blame universities for not allowing women to study there until well into the 19th century. Since few women took up physics and mathematics at that time, so the argument goes, fewer still would be brilliant enough to deserve prizes. But women will get there in time. One of the “side dishes” offered by *Out of the Shadows* is to show that this argument is flawed. The very few women who did have the courage to study physics and mathematics were extraordinarily talented and many of them deserved to be in the Nobel club. It was prejudice that made that impossible.

Edited by Nina Byers and Gary Williams of the University of California Los Angeles, *Out of the Shadows* brings the history of these women into the spotlight, collecting portraits of the life and work of 40 female scientists of the 20th century. Each chapter describes the important discoveries made by a particular woman and illustrates the life and working conditions in which her discoveries were made. The essays are written clearly and sometimes passionately so by distinguished physicists from the relevant field.

The main purpose of the book, as stated by Byers, is to “bring a more gender-balanced perception of physics”. But the book goes beyond that. It reveals that the shadow that has obscured women’s achievements in physics has its roots in prejudice and a misperception by scientists and administrators of what it takes to become a good professional scientist. The physics “boys’ club” could not conceive of the idea that a woman could reconcile family and career. As a result, many of these women worked unpaid or were even banned from academic institutions.

An early example from the book is Hertha Ayrton (1854–1923), a British mathematician, physicist and engineer who showed that the problems in the arc lights used for street lighting were caused by oxidation at the tips of the carbon anodes. She took out many patents for searchlights and cinema projectors, and in 1902 was the first woman to be nominated for election to the Royal Society. However, she was denied that honour when it was

deemed that married women were not eligible. Indeed, the Royal Society did not finally admit women until 1945 – biochemist Marjory Stephenson and crystallographer Kathleen Lonsdale were the first.

Another example is Harriet Brooks (1876–1933), the first person to observe the recoil of a decaying nucleus. She was obliged to resign her job at Barnard College in New York when they found that she was planning to marry. In the dean’s own words: “The College can not afford to have women on the staff to whom the college work is secondary; the College is not willing to stamp with approval a woman to whom self-selected home duties can be secondary.” She ended up abandoning science.

But being single did not make the life of the female scientist any easier. Such women were allowed to do research but not to reach positions of leadership. Mathematician Emmy Noether (1882–1935), responsible for the connection between symmetries and conservation laws, was not allowed to obtain her Habilitation, which was needed to become a professor in Germany, simply because she was a woman. David Hilbert, in his speech supporting her case, argued that: “This is after all an academic institution, not a bath-house.” Noether finally got her Habilitation only many years later, which affected her both financially and in terms of prestige.

Women in the “wrong” ethnic group faced even tougher challenges. During the Second World War, Austrian physicist Lise Meitner (1878–1968) was one of the pioneers in the study of nuclear fission. She and chemist Otto Hahn worked together on the project that led to the identification of barium as a fission product of uranium. But because she was a Jew, Hahn did not acknowledge her part in the discovery, in order to protect his laboratory. As a result she was excluded from sharing the 1944 Nobel Prize for Chemistry with Hahn: an injustice that affected her reputation and the possibility of her having her own laboratory after the war.

Ignoring the contributions made by women hurts science itself. If a discovery is not known, it may as well not have been made. For example, English mathematician Mary Lucy Cart-

wright (1900–1998) solved the dynamics of the nonlinear amplifier, in collaboration with John Littlewood. The solution of this practical problem includes phenomena such as period-doubling, bifurcations and abrupt transitions from periodic to aperiodic behaviour. If only scientists had paid attention to her work, chaos theory would have been born in 1942 instead of 20 years later.

After the 1960s the gender issue assumed more subtle forms. Medical physicist Rosalyn Sussman Yalow (b1921) developed the radioimmunoassay together with Solomon Berson. She and Berson were in line for a Nobel prize for this discovery, but the death of Berson in 1972 removed them from consideration. For the committee, he was the “brain” and she was the “brawn”. After his death she studied the structure of hormones and was awarded a Nobel prize in medicine in 1977. She had to create two masterpieces in order to be recognized for one.

So, if anyone asks me why there are so few female Nobel laureates, my answer is that many female scientists have deserved the prize but they were invisible to the community. When a woman finally gets the prize, she has usually done enough work to deserve at least two awards. Even if the percentage of women in science is small, the talent, the passion and the persistence required from them to survive in the field qualifies them. If you do not believe me, then just wear your “gender-balanced” glasses and check for yourself.

*Out of the Shadows* gives us a taste of that gender-balanced analysis. Some examples of female scientists from Eastern Europe and Asia are missing from the book but such individuals are in even deeper shadow. Young scientists both male and female will enjoy reading the book for the diverse list of inspiring role models that it includes.

Marcia Barbosa is at the Universidade Federal do Rio Grande do Sul in Porto Alegre, Brazil, e-mail [marcia.barbosa@ufrgs.br](mailto:marcia.barbosa@ufrgs.br). She chaired the 2nd International Conference on Women in Physics in 2005