



Mileva Marić and Albert Einstein in 1912.

PHYSICS

Einstein's wife: a life in shadows

Ann Finkbeiner reviews a study weighing up whether Mileva Marić contributed to the epochal theories.

In 1896, two students entered a Swiss university together. One was Mileva Marić, a 20-year-old Serbian; the other, Albert Einstein, a 17-year-old German. Both studied physics, taking some of the same courses and, in many of those, getting comparable course results. They studied together, fell in love, married. Einstein went on to found modern physics. Marić faced a barrage of personal and professional setbacks just as her career should have begun. Decades later, their letters, acquaintances' memories and biographies were published. And ever since, scholars have been arguing about how much credit for Einstein's astounding contributions to physics should go to Marić.

Einstein's Wife, the latest book on this contested history, has three authors. Science historian David Cassidy presents

**Einstein's Wife:
The Real Story of
Mileva Einstein-
Marić**

ALLEN ESTERSON &
DAVID C. CASSIDY,
WITH RUTH LEWIN
SIME

MIT Press (2019)

an evidence-based history of Marić's life and her marriage to Einstein. Allen Esterson, a former lecturer in physics and mathematics, analyses claims made for her influence and contributions. And Ruth Lewin Sime, chemist and author of the 1996 *Lise Meitner: A Life in Physics*, provides historical context on the status of the vanishingly rare female scientists of that era. The hope seems to be that the reader will put together evidence, analysis and context, and at least gain an understanding of the argument over credit. (For full disclosure, I read an early draft of the book at Cassidy's request and was unsure what to think; I find

the published book easier to assess.)

Marić dealt with prohibitions against women taking physics and maths courses by moving to countries and institutions in which the courses were open to women, and getting good marks. The Swiss Polytechnic Institute in Zurich (later, the Swiss Federal Institute of Technology, or ETH Zurich) was one such. Here, she and Einstein found they were equally unbrilliant at maths. In physics, their performances diverged, with her examination scores generally good, and his exceptional. Part of their bond seemed to be scientific: in Einstein's letters to her at the time, he writes repeatedly about ideas of relative motion and molecular forces — for which he later became famous — using the words “we” and “our”.

Over the next few years, Marić's career trajectory headed south: she did poorly in her exams, was denied a diploma, became pregnant while unmarried and in 1902 gave birth to a girl who either died or was adopted. She and Einstein finally married in 1903. Settling into the traditional housewifely role, she had another baby in 1904. As far as her science went, that was that. Then came Einstein's miracle year: his 1905 papers on atomic, quantum and relativity theory changed the agenda for physics. In 1919, the couple divorced after 16 years of marriage, having had a third child.

INDIRECT ARGUMENT

Marić neither published any research nor claimed credit for any of Einstein's; any work they did together would have been done privately. So all arguments for and against her participation in Einstein's miracles must be indirect. But lack of direct evidence has never stopped an argument. A 1969 biography of Marić by secondary-school science teacher Desanka Trbuhović-Gjurić claimed that her part in Einstein's success was “large and significant”. That verdict is based on hearsay from contemporaries, Marić's early academic success and Einstein's bequeathal of his 1921 Nobel prize money to her as part of the divorce settlement. Later, linguist Senta Troemel-Ploetz and Evan Harris Walker, a physicist and parapsychologist, interpreted letters that the pair wrote to each other and to others (along with interviews with their son Hans-Albert, in which he contradicted himself) as showing that Marić's ideas were central to Einstein's science. Over the years, this story has been repeated in a cottage industry of publications, most referring to the same few sources.

A woman's contributions going uncredited would, of course, hardly be surprising. Since the genesis of professional science in the nineteenth century, female

scientists, with notable exceptions, have often received no credit for their work. Furthermore, the work of those who collaborated with male relatives has often been subsumed into their brother's, father's or husband's body of work — think of astronomer Caroline Herschel or chemist Marie-Anne Lavoisier. In spite of mighty efforts to rectify the situation, such as Wikipedia's WikiProject Women Scientists, it still exists.

TENUOUS CLAIMS

But the fact that Marić was unlikely to be credited doesn't mean that she contributed, and Esterson presents the counter-argument. He tracks down and analyses, exhaustively, each source's sources. He finds, for example, that Einstein's use of "we" and "our" couldn't have referred to a real collaboration for several reasons: Marić herself seems not to have referred to special relativity, didn't repeat the pronouns in her letters and probably didn't have the grounding to contribute to the subject. Esterson's narrative is detailed, but also repetitive and

"The fact that Marić was unlikely to be credited doesn't mean that she contributed."

confusing, partly because he examines each reuse of particular sources. And because he invariably finds all advocates of the theory that Marić contributed to

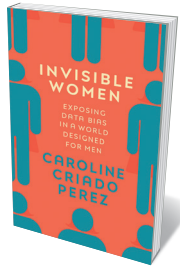
Einstein's work wrong, his argument seems contentious, even obsessive.

Credentialed historians including Gerald Holton have likewise dismissed the claims about Marić's contribution. But credentials seem hardly needed, because these claims are so tenuous. Those quoted by Esterson read like fan fiction, citing hearsay from relatives, over-interpreting facts or reporting conversations and events that no one but Marić and Einstein could have known. No evidence exists either way.

Somewhere under the noise and dust is the real person whom Cassidy's evidence shows: an intelligent woman who worked hard to get an intellectually demanding education and suffered deep personal blows on top of the deeper bruise of being the wrong gender at the turn of the wrong century. Our century needs to attend to her. The deck is still stacked against female scientists. A Mileva Marić coming of age in the twenty-first century would still face lack of credit — and it would be only one in a long list of barriers and biases. ■

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Books in brief



Invisible Women

Caroline Criado Perez CHATTO & WINDUS (2019)

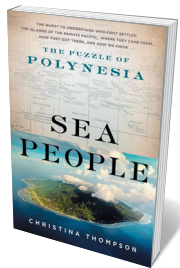
We live in a vast welter of data — and it is riddled with gender bias. So argues journalist Caroline Criado Perez in this pointed analysis, revealing how using men as the default in research has serious real-world impacts on women. In areas as diverse as medicine, labour and sanitation, many findings ignore half the population because of bad trial design (anatomically incorrect crash-test dummies, male-only drug-testing), algorithmic bias (say, in translation software or image data sets) or simple erasure of women from the historical record. A powerful call to bust the myths and bridge the gap.



The Evolving Animal Orchestra

Henkjan Honing (transl. Sherry Macdonald) MIT PRESS (2019)

In his 1871 *The Descent of Man*, Charles Darwin speculated that all animals might be biologically capable of perceiving musical cadence and rhythm. Inspired by the concept, musical-cognition researcher Henkjan Honing launched a quest to test it. Along with exploring musicality studies on species from rock doves to koi carp, he lab-hops to learn how male canaries court with thrilling trills; how zebra finches use the entire sound spectrum to gather information; how a California sea lion perceives beats (notably, in Earth, Wind & Fire's 1979 song 'Boogie Wonderland'); and more.



Sea People

Christina Thompson HARPER (2019)

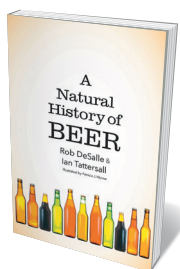
The Pacific Ocean covers more than 30% of Earth's surface. How did early Polynesians — united by a language family, culture, skills — navigate such vastness, and colonize islands as far-flung as Hawaii and New Zealand? In parsing that prehistory, Christina Thompson found herself piecing together biological, archaeological, geographical, anthropological and linguistic evidence from oral traditions, early European accounts and recent science. Her outstanding study brims with detail, not least on Polynesian wayfinding — holistic expertise based on myriad 'readings' of bird, cloud, light and wave behaviour.



War Doctor

David Nott PICADOR (2019)

For more than 25 years, surgeon David Nott has lived periodically "in a liminal zone where most people have neither been nor want to go": fields of war from Afghanistan to Bosnia. His memoir interweaves bold surgical feats on these sojourns in hell with his own psychological journey, a chronicle equally soaked in blood and insight. Now co-founder of a foundation training other physicians in this specialized work, Nott remains an important witness to the haunting human price of that modern triad: geopolitical instability, poor governance and ever more powerful weaponry.



A Natural History of Beer

Rob DeSalle and Ian Tattersall YALE UNIVERSITY PRESS (2019)

Curatorial eminences Rob DeSalle and Ian Tattersall serve up a potent scientific brew in this study of beer, explicating the underlying chemistry, neuroscience and culture with gusto. Crafted as long ago as the seventh millennium BC (in Jiahu, China), the grain-based tipple provides rich pickings, from the intricacies of barley biology and the pedigree of hops to the light absorption in a freshly poured glass of lager, the brain shrinkage behind a hangover headache and possible beer family trees. A marvellous pean to the pint, and to the researchers probing its depths. **Barbara Kiser**