

Hidden No More

On- and Offline Rewritings of the History of Women in Science

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While names like Charles Darwin, Albert Einstein, or Stephen Hawking have a familiar ring to us, most conversations about women in the history of science begin and end with Marie Curie. In 2014, a survey conducted by the British grassroots movement *ScienceGrrrl* showed that, indeed, the general public's awareness of women's contributions to science is limited. Over half of the UK population, the study revealed, suffers from the so-called 'Curie Syndrome', the inability to name more than one female scientist (Onwurah 2014). Undoubtedly, Marie Curie (1867-1934), winner of two Nobel Prizes, who was born in Poland but lived in France, deserves to be celebrated as one of the greatest scientists in history. Still, the popular impression that she was the only notable woman in the history of science is not only problematic because it paints a false picture of history, but because it preserves a masculine image of science. Indeed, even in the 21st century,

femininity and science still seem concepts at odds with one another. The belief that only men can be and always have been scientists, and that science requires a set of masculine characteristics, constitutes one of the most persistent barriers to girls' and women's entry to, and careers in 'STEM', i.e. science, technology, engineering, and mathematics. Rediscovering the history of women in science is one way of fighting against this gender bias. While feminist scholars began to rewrite science history from a female perspective some fifty years ago, their academic efforts have more recently been accompanied by various cultural interventions, which, in different media but with similar aims, seek to change the still common perception of the history of science as a parade of great men.

Women and STEM in the UK

Despite decades of affirmative action, women continue to be underrepresented in STEM education,

training, and employment in almost every region of the world (Unesco Institute for Statistics 2018). The United Kingdom is no exception, as figures from WISE, a campaign in the UK that promotes women in STEM, prove. While equal numbers of boys and girls take STEM subjects at the *General Certificate of Secondary Education* (GCSE), female participation begins to decline thereafter, most dramatically at the age of 16, with only 18% continuing to take a STEM subject at A-Level (WISE Campaign 2017a). In 2017, only 24% of STEM graduates (WISE Campaign 2017b) and only 8% of STEM apprentices (WISE Campaign 2018) in the UK were female. In the same year, women made up only 23% of those in core STEM occupations and 24% of those working in core STEM industries (WISE Campaign 2017c). There is only one British woman among the nineteen female scientists who have hitherto won the Nobel Prize: Dorothy C. Hodgkin (1910-1994), who became Nobel Laureate in 1964 for her development of protein crystallography and the discovery of the structures of vitamin B12 and penicillin. And even in 2018, over seventy years after first opening its doors to women, the world's oldest scientific society, the Royal Society in London, is still far from gender equal with only one in twelve fellows being female. (Fyfe and Mørk Røstvik)

Stereotypes and the Gender Gap in STEM

Identifying the reasons for STEM's gender gap and developing strategies to attract and retain girls and women have been the focus of much research and activism in recent decades. Cultural concepts of gender roles are often cited as one of the biggest roadblocks to girls' and women's interest in STEM. While in 2018, the BBC reported that more children than ever before now draw a woman when asked to draw a scientist (Halton), the stereotypical image of the brainy male researcher – presumably with beard, glasses, and a white lab coat – is still very much alive and kicking and continues to influence the public understanding of STEM. Though today girls are told that they can be whatever they want, gender stereotypes influence not only their self-concepts but also their treatment within schools and the workplace. British Nobel-winning biochemist Tim Hunt's chauvinist remarks about women only distracting men in the lab, which led to a public outcry in 2015 (Ratcliffe), is a prominent example of how gender stereotypes still lead to sexism in science.

Opposing Gender Stereotypes by Rewriting the History of Science

Rewriting the history of science from a female perspective to counter the age-old belief that women simply cannot

and never could compete with men in science is one way of going against gender bias in STEM. With the revival of the feminist movement in the second half of the twentieth century, the history of women in science has become a thriving field of study in academia. For more than fifty years now, feminist scholars have been drawing attention to the accomplishments, barriers, and conflicts of women in science throughout the centuries. As Dr Claire Jones, historian of science at the University of Kent, points out: “Although we must be careful not to overestimate how women were historically active in science, it is important to remember those women scientists who did contribute and the barriers they overcame to participate. This is one strand in tackling the continuing tension between femininity and science, providing female role models, and increasing women’s participation across all scientific disciplines” (Jones). Yet, revising the male-dominated and male-authored history of science is a project no longer solely undertaken within academia. In recent years, online activists and creative artists have been joining in, adding the little-known or forgotten stories of female scientists to our historical memory. While this is indeed a transnational phenomenon, British women are essential, both as creators and protagonists, to these on- and offline rewritings of the history of women in science.

Writing the History of Women in Science Online - One Wikipedia-Entry a Day

Providing girls and women with positive role models by spreading the word about their outstanding contributions to STEM is the goal of Dr Jessica Wade, a British physicist at Imperial College London and a prize-winning advocate for women in science.

Frustrated with measures to increase female interest and participation in STEM, such as the European Commission’s much criticized pseudo-pop video *Science: It’s a girl thing!*, in which three supermodels in lab coats, high heels, and safety goggles study the



Dr Jessica Wade

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chemical composition of lipstick and nail polish, Wade started her own initiatives to win girls and women for STEM.

(Devlin) Writing one biographical entry per day about a notable woman scientist on the free online-encyclopaedia *Wikipedia* is her latest project. Since the beginning of 2018, Wade has researched, written, uploaded, and tweeted (@jesswade) feminist Wiki-entries of hundreds of women, both contemporary and historical, focusing on her subjects' professional accomplishments and not their personal relationships: "[...] despite their best intentions, many campaigns to highlight women scientists can be reductionist, cynical and boring - celebrating a woman's gender rather than her achievements. Discovering a fantastic woman scientist as you were reading up on a new experimental technique or research area on *Wikipedia* is much more compelling than finding her separated from her expertise in a page of 'the Top 50 women you should know'" (Wade and Zaringhalam). By getting the stories of female scientists online, Wade fights not only for the recognition of women's scientific contributions and a change in the still persistently masculine colouring of STEM, but also against gender imbalance within the encyclopaedia itself, where only 17% of biographies are those of women and only 16% of editors female. (Wade and Zaringhalam)

Adding the stories of women in STEM to *Wikipedia*, Wade follows other fourth-wave feminists for whom the internet has emerged

as an important space of activism. In 2016, the American editor and medical student Emily Temple-Wood received the *Wikipedian of the Year Award* for her WikiProject *Women in Science*, which aims at increasing the quantity and quality of historical women scientists' biographies on *Wikipedia*: "By writing these and other women back into online accounts of science history, we hope to combat systemic biases that lead to the underrepresentation of women scientists on *Wikipedia*, in public discourse and in science itself", Temple-Wood points out. Wade and Temple-Wood reach out to a whole new generation of women and men whom they provide with easily accessible and well-researched biographies of women in STEM in order to revise the masculine image of science.

Offline Rewritings of the History of Science: Female Scientists on the Page, Stage, and Screen

The fight for the recognition of women's scientific contributions also continues offline. The innumerable biographies, history books, and academic papers that have been published by feminist scholars have most recently been joined by a surge of literary and filmic rewritings of the history of women in science. The Oscar-nominated Hollywood production *Hidden Figures* (2016) about three African-American women employees at NASA – Mary Jackson (1921-2005), Katherine Johnson

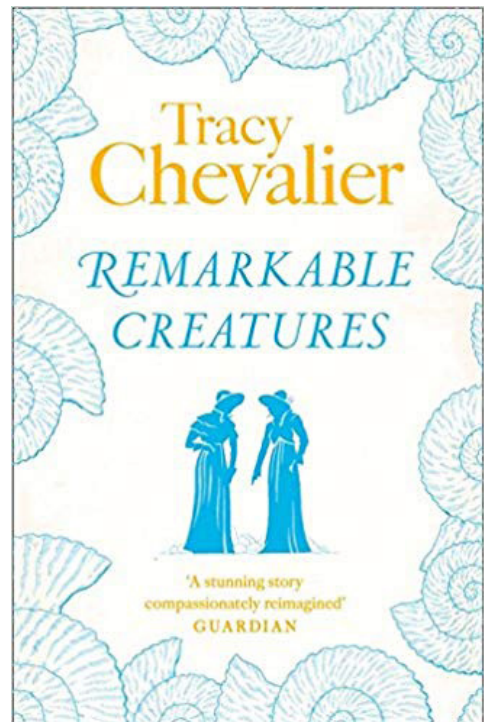
(1918-), and Dorothy Vaughan (1910-2008) – whose scientific expertise helped John Glenn in 1962 to be the first man in space to circle the Earth, is probably the best-known example of popularising the issue. Despite problematic ‘white saviour’-moments, which clearly undermine the film’s feminist potential, the biopic’s celebration of strong, ambitious, and intelligent women, who against the odds of gender, race, and class become outstanding mathematicians and engineers, has raised awareness of the masculine bias in both science and historiography. Yet, the US-focus of the film should not distract from the fact that British artists and British women scientists also figure prominently in recent rewriting projects.

In her 2009-novel *Remarkable Creatures* bestselling US American author Tracy Chevalier, who has been living in the UK for over thirty years, combines biographical fact with fictional imagination to recount the early life of the English palaeontologist Mary Anning (1799-1847), who was recently numbered by The Royal Society among the “most influential women in British science history”. In spite of being female, working-class, and without any formal education, Anning impressed the scientific community of her time with her ‘eye’ for fossils, discovering – among other rarities - the first complete skeletons of the *ichthyosaurs* and *plesiosaurs*. For



Tracy Chevalier

© Tracy Chevalier



Book Cover *Remarkable Creatures* (2009)

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her fictional revisiting of Anning’s spectacular fossil findings, which fuelled 19th century debates about the prehistory of the Earth and the origins

of life, Chevalier chose to focus on her collaboration with Elizabeth Philpot (1780-1857), another British fossilist. Despite differences in age and class, Philpot functions as Anning's mentor and advocate in this female bildungsroman. As first-person narrators, the two protagonists take turns in recounting Anning's life story, in which she moves from a minor fossil hunter and dealer to "the greatest fossilist the world ever knew" (Torrens 1995), to quote historian Hugh Torrens. The biographical novel highlights women's scientific abilities and achievements without omitting the obstacles put in the way of early 19th century women, who overstepped social boundaries, by a misogynist, patriarchal society and scientific community. The novel's feminist agenda is not only visible in the centrality it attributes to women's concerns, experiences, and perspectives, but in its celebration of sisterhood as an important way of female survival in the male-dominated world of science. Chevalier weakens the feminist potential of her novel, however, when she uses her poetic license for the inclusion of an entirely fictional romantic subplot. While an unfulfilled love interest is made to figure as an important step in the fictional Anning's development, the rift that the romance causes in the empowering friendship between the two female protagonists seems rather counterproductive to this otherwise feminist portrait of strong,

ambitious, and talented women in the history of science. Thus Chevalier steps into the trap Wade in her Wikipedia entries explicitly tries to avoid: highlighting the romantic encounters in the narration of women's lives rather than their scientific achievements.

Another British female scientist has captured the interest of a bestselling author: American writer Jennifer Chiaverini has found one of her latest protagonists in the English mathematician and pioneer of computer science Ada Lovelace (1815-1852), who is best known for her work on Charles Babbage's Analytical Engine. *Enchantress of Numbers* (2017), a title bestowed upon Lovelace by Babbage himself, is written as a fictional autobiography, in which the scientist recounts key moments in her emotional and intellectual development.



Mary Anning with her dog Tray and the Golden Cap outcrop in the background, Natural History Museum, London, painted before 1842, credited to 'Mr Grey'

Providing its readership with a meticulous portrait of 19th century British society and gender roles, this Neo-Victorian novel chronicles Ada's rising passion for science, which is carefully cultivated by a mother eager to suppress her daughter's artistic heritage – Ada was, after all, the only legitimate child of one of Britain's greatest poets, Lord Byron.



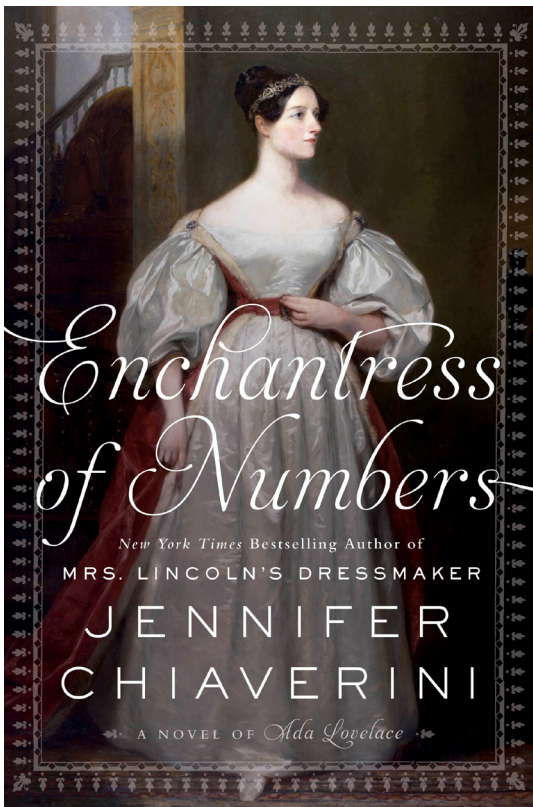
Jennifer Chiaverini
© Michael Chiaverini

While *Enchantress of Numbers* does not exclude the historical figure's experiences of marriage and motherhood, it is not the love for her husband or children but her passion for mathematics that dominates the protagonist's life story. Indeed, it is not an eligible young gentleman that makes the heroine swoon at a dinner party, but the leading British mathematician of the day, Mary Somerville (1780-1872), Lovelace's role model and mentor. Portraying her enormous talent for mathematics and her eventual collaboration with inventor Charles Babbage, the novel does not fail

to expose the difficulties and restrictions a Victorian upper-class woman like Lovelace had to deal with when venturing into the male-dominated world of science. The fictional memoirs' emphasis on discourses that frame femininity and math as a contradiction make Lovelace's struggle against traditional gender roles and masculinist concepts of science undoubtedly relevant for a 21st century readership.

Double-dealing around the double helix

British women scientists are also now entering the theatre stage. American dramatist Anna Ziegler's critically-acclaimed and prize-winning one-act play *Photograph 51* tells the story of the race for the discovery of the structure of DNA, focussing on British crystallographer Rosalind Franklin's (1920-1958) often forgotten role in it. First staged in the US, the play attracted enormous attention when it premiered in London's West End in 2015, with Hollywood actress Nicole Kidman in the leading role. While the drama indeed puts Franklin's story centre stage, it is not the female scientist but a chorus consisting of her male colleagues that leads the audience through her story. The fictionalised characters of Francis Crick, James Watson, and Maurice Wilkins, who in real life received the Nobel Prize for discovering the DNA double helix structure in 1962 (four years after



Book Cover Enchantress of Numbers (2017)

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Franklin's untimely death), are given the chance to retrospectively set the record straight and to 'publicly' acknowledge Franklin's role in their fame and fortune.

Given the historical facts, however, the play is more a critique of sexism in academia than an empowering portrayal of a woman's success story. While the biographical drama does not fail to portray Franklin as a brilliant and passionate scientist, it concentrates on revealing her male colleagues' misogynist attitudes and behaviours, which generate endless experiences of discrimination, exclusion, and disregard for Franklin. Indeed, the play suggests that it was Franklin's personality, above all her unwillingness to cooperate,

which prevented her final triumph in the discovery of 'the secret of life', and contributed to the men's scientific betrayal when they appropriated her photo 51, which proved the DNA double helix structure. Yet, sympathy clearly lies with Franklin, who in the end leaves the stage not only professionally defeated but terminally ill: Ziegler indeed stretches historical fact to have Crick's and Watson's scientific breakthrough coincide with her protagonist's cancer diagnosis, a rather melodramatic touch that ennobles this depiction of gender discrimination in the lab by framing it as a tragedy. *Photograph 51* is a timely piece that highlights a woman's scientific achievements while raising awareness for academic sexism and gender bias in recognising female contributions to science.

The attention that creative artists and online activists are beginning to pay to the lives and accomplishments of female scientists is undoubtedly a positive development, supporting activities to raise the numbers of women in STEM. Stories of women's scientific achievements which allow movie- and theatregoers, historical fiction readers, and *Wikipedia* users to empathise with strong female role models are vital in challenging the public perception of science as a masculine pursuit. While this alone is certainly not sufficient to fix STEM's gender gap, it does justify hopes that these on- and offline rewritings of

the history of women in science may help to improve our chances to eventually overcome the ‘Curie Syndrome’.

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