

Women must not be obscured in science's history

The literature has often failed to acknowledge female researchers. But a new generation is changing the narrative.

Last month, NASA named its Washington DC headquarters building after the late Mary W. Jackson, the agency's first Black female engineer and an aeronautics expert who specialized in how air flows around aircraft. It was a poignant moment, because this recognition for Jackson comes more than a decade after she died, in 2005. Indeed, her achievements might not have had such exposure had it not been for Margot Lee Shetterly's 2016 book, *Hidden Figures*, and the accompanying film released in the same year. Both recounted the story of a group of Black female mathematicians, including Jackson, who worked at the Langley Research Center in Hampton, Virginia.

Naming a government building in Washington DC after Jackson is noteworthy, but it is just one small step towards addressing wider problems in the study of the history of science and engineering. As Women's History Month draws to a close, we are very conscious of how the science-history literature – including much of the *Nature* archive – has failed to recognize the achievements of female researchers, and particularly those from marginalized communities. Their work has long been obscured, and sometimes even eliminated from the record, but initiatives are now under way to right this wrong.

As in most fields, it is men – often white men and men from institutions in high-income countries – that dominate the community of science historians and the scholarship produced in history-of-science journals. And the exclusion of female historians has been exacerbated by the COVID-19 pandemic. The history-of-science journal *Isis* has seen a sharp fall in the number of women submitting manuscripts. Female and male authors submitted papers in equal numbers in January and February 2020, but since March that year, male authors have outnumbered female authors by more than three to one, probably because more women than men shouldered caring and domestic responsibilities once lockdowns began.

However, a new generation of science historians is emerging, with potentially mould-breaking consequences. *Nature* spoke to several of these researchers, both women and men. They described the roots of some of the problems, and highlighted a number of efforts towards a more diverse, inclusive and global history of science.

The researchers reiterated how much of the literature in science and engineering history is framed around a

narrative of the 'great hero scientist' – a man who often makes breakthroughs by himself, on the strength of some special insight or individual genius. Where the records show collaborators, these people are also more likely to be men. None of this is new, or surprising. Science is rife with racism and sexism. Throughout history and around the world, science has continued while women have been denied access to educational opportunities; laboratory and field work; and the institutional structure of academia, publications and learned societies. Contributions from women, especially women of colour, have often been obscured, if not deliberately erased.

Cairo-based historian Heba Abd el Gawad, at University College London, recounts the story of a female excavator from the 1880s who worked with Egyptologist and eugenicist Flinders Petrie. Sadly, we will never know who she was because the records list only her father's name – Mohammed Hassan. She would have needed to provide his name to secure a job, a practice that still exists in some countries. Petrie never bothered to ask his female colleague's real name, el Gawad explains.


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Unconventional sources

In science history, the archival manuscript is one of the main sources of evidence on which research – and, indeed, entire careers – is constructed. In today's context, such documents are the equivalent of a journal article or an academic monograph. So if historians are to take a more inclusive approach, the sources of evidence will need to be expanded, by searching for voices that have been silenced and acknowledging contributions that have been denied. That is now starting to happen.

Oral histories in different languages can serve as sources of information, and so can personal artefacts, which can be incorporated into archives, says Sarah Qidwai, a historian at the University of Toronto, Canada. An upcoming five-volume encyclopedia – a collection of primary sources of material from female scientists, including written sources, images and links to audio and other material – is due to be published in the next few years. This work, provisionally titled *Gender, Colonialism, and Science, 1750–1950*, is being edited by Donald Opitz, a historian at DePaul University in Chicago, Illinois, and Banu Subramaniam, a biologist and gender-studies scholar at the University of Massachusetts Amherst.

Hidden figures will not be found without stretching the archive, says Emily Rees, who researches women and technology at the University of Leeds, UK. Rees and her colleagues are trying to do just that with their Electrifying Women project: they're searching conference archives and other under-explored sources for information about the contributions of female engineers from outside Europe and North America.

Leadership institutions involved in the history of science are also starting to move. Last July, the British Society for the History of Science held a global digital festival that tackled questions such as how to identify under-represented voices in archive material. At universities, exciting collaborations are forming between faculty members and

students, such as the student-led project Science Beyond the West at the University of Pennsylvania in Philadelphia.

All this work takes time, organization, funding and recognition of the importance of incorporating perspectives from researchers who have long been marginalized. This doesn't necessarily mean coming up with a fresh list of 'unsung geniuses' to add to the great-hero narrative. As historian Patricia Fara, at the University of Cambridge, UK, has noted, biographies of female scientists can also perpetuate stereotypes. All fields of history are going through a process of reflection and change. Science's history should be no different if women are to get the recognition they deserve.

Dial down the vaccine rhetoric

Vaccine confidence will be the casualty of Europe's war of words over the AstraZeneca–Oxford COVID-19 vaccine.

In January, French President Emmanuel Macron called the AstraZeneca–Oxford coronavirus vaccine “quasi-ineffective for people over 65”, on the day that the European Medicines Agency (EMA) recommended approving it. Kate Bingham, one of the architects of the UK vaccine-procurement programme, has since called the remarks “irresponsible”, because the vaccine has been recommended by regulators for use in people of all ages.

Although some 20 million doses of the vaccine developed by AstraZeneca, based in Cambridge, UK, and the University of Oxford, UK, have been administered across Europe, a political war of words has erupted over its safety and efficacy. Such interventions risk increasing vaccine hesitancy. Communication on vaccine safety and efficacy must always be handled with extreme care.

Last week, regulators in more than 20 European countries paused the vaccine's roll-out for a few days after a very few cases of blood clots were detected in people who had been vaccinated. These were 7 cases of clots in multiple blood vessels (disseminated intravascular coagulation) and 18 cases of clotting known as cerebral venous sinus thrombosis. Among the people affected, nine deaths had been recorded.

The EMA, which is based in Amsterdam, reviewed the evidence, and recommended that injections be resumed, because the benefits of vaccination overwhelmingly outweigh the risks. But it is amending information for patients and health-care professionals to mention the rare cases of clotting. The agency also says it will continue to review the risks of these conditions from the vaccine.

The regulators are acting within their remit, as they need to. The EMA paused the roll-out and assessed the evidence

in response to concerns. The atmosphere is febrile as vaccines are distributed at a speed and on a scale never seen before. Researchers are rightly debating the risks and benefits of the pause, but what countries don't need is their politicians and policymakers offering opinions on safety and efficacy in parallel to the work of independent regulators.

Vaccine hesitancy is of mounting concern around the world, and Europe is now experiencing its third wave of the pandemic. It's becoming clear from research that mistrust in governments is a factor for those reluctant to be vaccinated. In a survey of 13,000 people in 19 countries carried out last June, health-policy researcher Jeffrey Lazarus at the University of Barcelona in Spain and his colleagues found¹ that people with little trust in government were less likely than others to say that they would get a vaccine.

Mistrust in governments comes in many forms. In France, for example, vaccine hesitancy is associated with public controversies involving the government and the pharmaceutical industry². Researchers say that a loss of trust coincided with the government overestimating the need for vaccines against H1N1 swine influenza in 2009. A study³ published last year reported that people who do not vote for the main French parties of government were less likely to say that they would get the COVID-19 vaccine.

A more severe example of the impact that government actions can have on public perception of vaccines stems from a campaign by the US Central Intelligence Agency. In 2011, Osama bin Laden, leader of the Islamist terrorist group al-Qaeda, was thought to be hiding in the city of Abbottabad in northern Pakistan. To confirm this, the CIA set up a programme in which staff vaccinated children against hepatitis B to gain access to people's homes⁴. This violated the trust between people and their health-care professionals, and set back vaccination efforts in Pakistan.

The knowledge that trust in governments is falling and that mistrust in government and institutions fuels vaccine hesitancy has also helped researchers propose interventions to boost engagement. Authorities worldwide are employing more-trusted individuals, such as people from health care, research, trusted religious and community leaders, and celebrities from the arts, entertainment and sport, to encourage vaccine take-up.

In all countries, vaccines are approved through independent regulatory processes. Crucially, these decisions are based on evidence from studies, independently of politicians and policymakers. When politicians speak out of step, they potentially undermine those processes. And when a regulatory process is undermined, that produces a risk to vaccine confidence.

The world must emerge from this pandemic with as many people as possible vaccinated. To achieve that, people in politics must leave judgements on vaccination safety and efficacy to the independent experts that they – and their publics – have entrusted with making these decisions.

“Mistrust in government and institutions fuels vaccine hesitancy.”

1. Lazarus, J. V. et al. *Nature Med.* **27**, 225–228 (2021).

2. Ward, J. K., Peretti-Watel, P., Bocquier, A., Seror, V. & Verger, P. *Nature Immunol.* **20**, 1257–1259 (2019).

3. The COCONEL Group. *Lancet Infect. Dis.* **20**, 769–770 (2020).

4. Martinez-Bravo, M. & Stegmann, A. CAGE Working Paper no. 544 (2021).