PROFILE

Clemency Montelle

Clemency Montelle grew up in the beautiful Garden City, Christchurch. She enrolled at the University of Canterbury but having no idea what to study, she decided on Mathematics as she had loved it at school, and on Greek and Latin because she was fascinated by ancient scripts and the complexities of inflected languages. In her fourth year, while browsing the library shelves for a Greek essay, Clemency came across Euclid's Elements in ancient Greek, a text that she was surprised to find united her interests. This proved to be a "lightbulb moment" for her, in which she realised that she could read about mathematics and science in other languages and rediscover ancient insights. This experience highlighted for Clemency the value of physical libraries, as well as setting her on a new interdisciplinary path.

After finishing her BA(Hons) she won a Fulbright scholarship to Brown University in Providence, Rhode Island, in the USA. Her PhD was in the History of Mathematics Department, where she read ancient mathematical texts in Greek, Latin, Sanskrit, Arabic, and Cuneiform and examined their mathematical content. These ancient languages are important for understanding not only the rich Asian and Middle Eastern, but also the European scientific traditions. Although many Latin and Greek texts have been lost in their original forms, they were translated into Arabic over a thousand years ago and can be recovered today. As Clemency points out, the so-called 'Dark Ages' did not occur everywhere and Arabic, Indian and Chinese science continued to flourish during periods when European traditions stalled.

Clemency's research draws together history, mathematics and ancient languages to understand how India has contributed to global science. As she highlights, "many histories of science have centred on the so-called 'western miracle' in their analysis of the ignition and flourishing of modern science, [but] they have done so at the expense of other non-European traditions." Her research aims to rebalance our understanding of the history of science. India is of particular interest because it is the direct scientific heritage of around one sixth of the world's population. The cultural context in which mathematics was done in India was also quite different from our own, hence the fascination to uncover the diverse ways in which early peoples practised mathematics.

The frequent neglect of the non-European history of scientific development motivates Clemency's research. Together India and China hold around a third of the world's population and have been resurgent global powers

in recent decades. These regions also have expansive histories, and long traditions of intellectual enquiry. The number of surviving manuscripts has been estimated to be in the millions, many of them scientific. Yet these regions' histories, especially in the sciences, are frequently underappreciated by those outside of them. Many scientists lack the linguistic skills necessary to interpret historical scientific texts, while linguists may be daunted by the mathematics contained within.

In 2010, Clemency received a Marsden Fund Fast-Start grant to help bridge this gap. Her project examined the development of computational procedures and mathematical tables in Sanskrit through the second millennium. Clemency states that this grant was validation of the importance on focusing on India, as well as an important personal endorsement for her scholarship. Through this grant, she was able to undertake extended research in the libraries and archives of India, build international collaborations from South Asia to France, and publish widely on Mughal and Indian astronomy, mathematics, and scientific methods.

Building on this success, Clemency was awarded a five-year Rutherford Discovery Fellowship in 2012. This fellowship has allowed her to return to India for further research into mathematical, astronomical, and scientific manuscripts.

Recently, Clemency was part of an international group of academics that challenged Oxford University's findings about the use of zero in an ancient Indian manuscript. They argue that the work written on the leaves of the Bakhshali manuscript is a unified treatise on arithmetic that must have been written at the time of the latest of the manuscript's leaves, not the earliest. Contrary to the different dates the radio carbon dating suggests, the treatise shows no signs of being a jumble of fragments from different periods, the academics say. Both the handwriting and the topic being discussed are continuous across the boundary of the first two dated leaves. It looks very much as if the scribe, who may have lived at the end of the eighth century, wrote out his treatise on a group of leaves that had been manufactured at very different times. But of greater significance for the history of mathematics is the authors' evidence showing that the Bakhshali treatise does indeed know the "true" zero, and contains calculations like long multiplication that would have necessitated using zero as an arithmetical number. From various other features of the manuscript's style and content, the team concludes that Oxford's claims are implausible and do not fit with what has previously been discovered about the Bakhshali Manuscript.

More generally, Clemency's research seeks to reintroduce Indian scientific traditions into the history of science. Throughout her research in India, Clemency has sought to build local connections and capacity, joining a movement to encourage local knowledge of the subcontinent's impressive intellectual traditions. She works closely with the Chennai Mathematical Institute and the Indian Institute of Technology in Mumbai to increase scholarship and teaching of the history of science. She also co-founded the History of Astronomical and Mathematical Sciences in India (HAMSI) working group, which brings international scholars together, mostly recently in Christchurch.

Clemency hopes her research will help make mathematics and the history of science more accessible to scholars and students. She uses her unique approach to maths as a way to humanise the STEM subjects, and to draw new students to these disciplines. She notes that "maths is not culture-free", and that highlighting science's diverse history can attract people who might not fit the bill of the stereotypical STEM student. As technology companies and academic departments continue to struggle with diversity, this remains an important mission.

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