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Preprints, press releases and fossils in space: What is happening in South African human evolution research?

Significance:

Uploading unreviewed manuscripts to a preprint server promotes accessibility and facilitates rapid breakthroughs. We, however, question the motivation of Berger and colleagues who used the new eLife publishing model to launch what appeared to be a carefully curated media campaign around an unreviewed narrative, thereby manipulating accepted norms in scientific publishing. This team has engaged in ostentatious public displays under the guise of promoting science, including launching precious fossil remains into space. Given these ethical concerns, we call on the public, heritage and scientific practitioners to reflect on the current state, and future, of human evolution research.

2023 was a big, busy year for the field of human evolution research, or palaeoanthropology, in South Africa – it attracted headlines, debate and controversy. The focus is the Rising Star Cave system, within the UNESCO Cradle of Humankind World Heritage Site, known as the Cradle, which is home to the fossil remains of our distant relative, *Homo naledi*. The Cradle has produced much of what we know about early human evolution and its cave sites are the single richest collection of early human, or hominin, fossils anywhere on earth. The caves and fossils of this region have been the subject of research, debate and media interest for almost a century. But 2023 marked a departure from what is considered normal in even this oft acrimonious, competitive research field.

On 5 June 2023, three multi-authored manuscripts were posted as pre-prints on the bioRxiv server, by a team led by Lee Berger.¹⁻³ These manuscripts had been submitted previously to the online only journal *eLife* and were sent for peer review on 4 May 2023. The posting on the preprint server a month later was done in accordance with the new eLife open publishing model, launched in March 2023.⁴

There followed a huge, coordinated, and thorough media coverage of not the actual manuscripts but the central, as yet unreviewed, narrative that *Homo naledi* had buried their dead, and made art and stone tools. The news reverberated around the world, with headlines on CNN, *The New York Times*, *National Geographic* and beyond. This was accompanied by a blitz of media interviews and television appearances by Berger. This gave the impression of a carefully planned and curated media exercise, with field photos, figures from the manuscripts and dramatic artistic reconstructions featured in online and print media.

Then on 12 July 2023, peer reviews of the three manuscripts were posted on the respective webpages of each preprint on the eLife system⁵; four reviews appeared each for Berger et al.¹ and Berger et al.², and three reviews appeared for Fuentes et al.³ Ten of these eleven independent peer reviews rejected the claims put forward in the three manuscripts. A subset of senior authors responded⁶, but are yet to revise the manuscripts. Five days later, on 17 July 2023, a Netflix documentary titled *Unknown: Cave of Bones* was released in 24 countries around the world, featuring the same narrative as the unreviewed manuscripts and initial media releases, that is, that *Homo naledi* had buried their dead, and made art and stone tools. This was followed in October 2023 by a book with a similar title.⁶

How did all of this happen? How could an unreviewed narrative enter the public realm in such a comprehensive way and then be almost unanimously rejected by peer review? The answer is eLife's new publishing approach, and what we view as the deliberate exploitation of this model by the Berger et al. research team. eLife launched their new publishing model in March 2023.⁴ This model is a marked departure from the traditional model in which authors submit a manuscript and a journal editor either desk rejects or sends the manuscript for peer review. The editor then accesses the reviews and passes these back to the authors with the editorial decision to either reject or publish a revised version of the manuscript, with minor or major revisions. This has been the standard practice since the mid-1970s, as a measure of quality control and a means to improve the standard of scientific outputs. Only in rare cases is a manuscript accepted more or less as is; we emphasise this point: almost all manuscripts are subject to some level of revision prior to publication.

eLife states, in their own words, that while “authors still receive a high-quality peer-reviewed eLife publication”, their new model is different in two key ways.⁴ For clarity, we quote them directly: “Firstly, all papers that are invited for review are published on the eLife website as a Reviewed Preprint, giving readers an earlier view of the reviews and editor’s assessment. Secondly, the authors control the next steps. This can include submitting a revised preprint or publishing their Reviewed Preprint as a Version of Record which will be sent to indexers like PubMed and can be listed in funding, job applications and more.”

Our view is that these two key differences have been exploited by Berger et al. The requirement that the manuscripts be placed on a preprint server was satisfied, but the team then used this version of the manuscripts to launch their massive media announcement. In their later response to the eLife commissioned reviews⁶, the team disclose that they had “benefited from a previous round of review of the manuscript describing the proposed burial features, which underwent two rounds of revisions in a high-impact journal over a period of approximately 8 months during 2022 and early 2023”. The manuscript including the deliberate burial data set and accompanying narrative had been peer reviewed, and presumably rejected by a ‘high impact journal’ editor, meaning that the authors had an idea of how their interpretation was going to land with the scientific community. Then, rather than wait for a new set of



peer reviews, they chose to go ahead with the media campaign without having met peer review approval.

Immediately after the preprints were released, critical commentary emerged.⁷ The manuscripts were criticised by the reviewers, who wrote long, detailed, meticulous reviews of all aspects of the data, claims and interpretations. These reviews are all publicly available on the eLife site.⁵ The team responded to the reviews by thanking the reviewers but argued that they maintained their original interpretations, although they are yet to present a detailed scientific rebuttal of the criticisms, nor revise the manuscripts. This means that the original, unreviewed versions are taking the place of reviewed manuscripts and the authors, not the editors, are deciding what quality of research is considered acceptable.

There was very little media coverage of the peer-review reports and responses from the scientific community, compared with the huge media blitz around the preprints. Discussion on X (formerly Twitter) exploded with commentary and opinions; *Nature* covered the response to the reviews⁸, but the mainstream media that had disseminated the deliberate burial/art/tool narrative looked the other way when this interpretation was condemned by the scientific community.

The 'Cave of Bones' Netflix documentary soared to the top of the 'most watched' in South Africa in the weeks after it first aired. This team appeared to have moved beyond interpretation of their data, to create an entire narrative arc to explain their observations, without having been subject to the usual rigours of scientific publication. Indeed, they took deliberate steps to curate and promote their version before it was approved by the peer-review process. Filming an entire documentary is not a trivial exercise, and this piece was made, edited, scored and readied for release before the actual science had been reviewed, criticised, revised and taken its place within what the scientific community accepts as new knowledge. This is not just a muddle of dates, or a slip of the tongue at a stressful press interview by a media-shy academic. This appears to be a deliberate and well-planned exploitation of a new publishing model to shortcut the usual scientific process of academic publishing.

How did we get here? What are preprints, what is their normal role, and how is their use going to impact future research? These are important questions. As we are not experts on this topic, we offer up an explanation from the preprint server bioRxiv⁹: "Because this [sic traditional] process can be lengthy, authors use the bioRxiv service to make their manuscripts available as 'preprints' before certification by peer review, allowing other scientists to see, discuss, and comment on the findings immediately." For other scientists to see, discuss and comment; not to orchestrate a press release and Netflix documentary.

The bioRxiv explanation continues: "Readers should therefore be aware that articles on bioRxiv have not been finalized by authors, might contain errors, and report information that has not yet been accepted or endorsed in any way by the scientific or medical community." This is a very clear and precise warning that places the preprints into the context in which they should be used and makes clear how they are intended to be viewed. There is also no ambiguity about how these preprints should be used by the media; bioRxiv cautions, "We also urge journalists and other individuals who report on medical research to the general public to consider this when discussing work that appears on bioRxiv preprints and emphasize it has yet to be evaluated by the medical community and the information presented may be erroneous." None of this caution was mentioned in the media coverage nor the Netflix film.

What we saw unfold in 2023 is the intersection of an established publishing norm in some fields (preprints) and a research team that has sought to disseminate a singular, interpretative narrative prior to peer review. Preprints per se are not the issue here – posting unreviewed research on a preprint server is not new or controversial; we saw during the pandemic that this was useful and productive, and how research on treatments for COVID-19 and vaccine development could proceed very quickly when aided by the sharing of results and open reviews.

But palaeoanthropology is not a field that needs urgent research and rapid breakthroughs. Given the huge and wide public interest in human

evolution and our origins, this research field benefits from much slower, measured, and careful research. The Cradle has produced an invaluable fossil record, and the Rising Star Cave is no different. The puzzle of how so many fossil bones of a small-brained hominin ended up in a now inaccessible chamber of a deep underground cave system is an intriguing question. A slow, rigorous, traditional approach to researching this cave and its associated fossils will yield exciting new results; there is no demonstrable need to peddle an unreviewed narrative to the public.

June and July 2023 were eventful and controversial months for palaeoanthropology research and publishing in South Africa. Surely no one could have anticipated what followed just two months later. Berger, with the permission of the South African Heritage Resource Agency (SAHRA)¹⁰ and the curating institute responsible for the Cradle fossils, the Evolutionary Studies Institute at the University of the Witwatersrand¹¹, sent a thumb bone of *Homo naledi* and a fragment of the collar bone of *Australopithecus sediba*, into space. These two fossils were placed in a custom-made carbon-fibre tube and carried by billionaire Tim Nash, who was a passenger on the Virgin Galactic space flight on 8 September 2023, and is also a landowner in the Cradle.^{10,11}

The reason given in the request for temporary export of the fossils out of South Africa by Berger was "to promote South African science"¹⁰. However, the media coverage of the fossil spaceflight was even more focused on an American audience than the June preprint splash. Coverage by the South African media, a week later, focused on the outrage of both local and international scientists¹²⁻¹⁴ who argued that this endeavour had little scientific merit and was a publicity stunt. As if palaeoanthropology in South Africa had not suffered enough reputational damage, this took place during the month of September, Heritage Month in South Africa, during which we reflect on, celebrate and honour our heritage.

This space flight takes us into murky waters, raising questions of ethics such as 'whose heritage is this anyway?' and questioning why privileged people can take fossils to space for no valid reason, while the poor communities from where the fossils originate are excluded from even talking about how they could benefit from accessing the material.¹⁴ We are referring to the case of the local community at Taung in the Northern Cape and their repeated requests for not only access but for a return of the 'Taung child' fossil to the town.¹⁵

While it feels like this surely must be the end of this story, it is not. On 10 November 2023, a peer-reviewed article was published in the *Journal of Human Evolution* titled 'No scientific evidence that *Homo naledi* buried their dead and produced rock art' in which Martínón-Torres et al.¹⁶ systematically dismantle every aspect of the three preprints and argue convincingly that the evidence provided by Berger and his team in no way supports their interpretations. There was some media coverage of this article and the reaction to it, but, again, not on the same scale as that of the June coverage.

So, looking back at an eventful 2023, we are left with more questions than answers. Is the media narrative and a fascinating story more important than peer review? Are we looking at sensational documentary films setting the pace, tone and quality of South African research into human origins? Are some claiming to promote South African science actually doing more harm than good? Are our precious, rare fossils being used to promote individual agendas with disregard for the risks? Is it not our academic responsibility to entrench our work, and especially public engagement initiatives, in scientific integrity?

In our view, the answer to all these questions is yes. We end with a final question for the South African palaeoscience, and broader research, community: Is this what we want? We call on this community, as well as on the funders, heritage practitioners, permit granting agencies, and government research bodies, to take a long hard look at human evolution research and its associated disciplines in 2023 and consider where we want to be in 2024 and beyond.

Competing interests

We have no competing interests to declare.



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