

The Bakhshali manuscript: The world's oldest zero?

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Last month, the Bodleian Library at Oxford University announced that a Sanskrit manuscript housed in the library for the last century had been dated using radiocarbon techniques. Oxford's radiocarbon dating laboratory announced that the three of the birch-bark folios of the Bakhshali Manuscript could be dated to roughly 300 CE, 700 CE and 900 CE.

The key result was, the library said, that one of the manuscript's leaves contained the oldest known written zero.

The library also announced that the zero in the manuscript was not a "true" zero, in the sense that it functioned only as a marker showing an empty decimal place, and not as a fully-fledged number that participates in calculations.

An international group of historians of Indian mathematics has now challenged Oxford's findings.

The team, which includes scholars from universities in the USA, France, Japan, New Zealand and the University of Alberta in Canada, has published a peer-reviewed article that refutes several of the Library's key assertions.

The scholars 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. The

treatise shows no signs of being a jumble of fragments from different periods. 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. Furthermore, the treatise even contains a statement saying, "having added one to zero....," thus proving that the early Sanskrit author was thinking about zero in a numerical way.

The zero in the Bakhshali treatise is younger, but more important than Oxford claimed.

The international team ends its article with a plea to Oxford University's Library that important and complex scholarly topics should be published through established academic channels involving peer-review, and not through sensationalizing press releases to the media.

More information: Dominik Wujastyk et al, The Bakhshālī Manuscript: A Response to the Bodleian Library's Radiocarbon Dating, *History of Science in South Asia* (2017). [DOI: 10.18732/H2XT07](https://doi.org/10.18732/H2XT07)

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