

## Evolution & Behaviour

# Did Homo naledi meet Homo sapiens in South Africa?

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Our research team has determined the age of [Homo naledi](#), a new species of hominin (human ancestor), from the [Rising Star Cave](#) in [The Cradle of Humankind World Heritage Site](#), South Africa. We have also announced the discovery of a second chamber (the Lesedi Chamber) deep in the Rising Star Cave, containing an additional 133 *Homo naledi* fossils (6). These new fossils and the new dates challenge our understanding of the course and complexity of human evolution (7).

The initial discovery of ~1,550 bones belonging to *Homo naledi* was made in 2013 (3), ~30m below the Earth's surface, in the dark and difficult-to-reach Dinaledi Chamber. The *Homo naledi* fossils were originally presented (3, 4) without a date, as their geologic setting (the location where the fossils have been found) was not favorable for traditional fossil dating approaches, such as dating volcanic ash layers.

To overcome this challenge, we devised a comprehensive dating methodology, involving five different techniques. This approach included dating the *Homo naledi* fossils directly, as well as dating the sediments that the fossils are buried in and the flowstones (calcium carbonate deposits, such as stalagmites) that cover the fossils and surrounding sediment in the chamber.

We can determine how old some fossils and geologic materials (such as flowstone) are using radiometric dating. This is possible because bones and minerals can contain small amounts of radioactive elements ("parent" isotopes, like uranium) that get incorporated into the material at the time of fossilization or crystallization, which then naturally breakdown into more stable elements ("daughter" isotopes, like

thorium) at a known rate. By measuring the ratio of "parent" (e.g., uranium) to "daughter" isotopes (e.g., thorium), we can calculate how long ago these rocks and fossils formed. Flowstones in the cave were dated this way ([U-Th dating](#)), and the teeth of *Homo naledi* were also dated by the method outlined above, in combination with a related method called [Electron Spin Resonance dating](#).

We used a third dating technique called [Optically Stimulated Luminescence](#) dating, which allows us to determine the last time that quartz sand (sediment in the cave) has been exposed to light. This technique allowed us to measure how long it has been since sediment (quartz sand) has been washed into the dark cave chambers. The results from this dating method were consistent with our other results; however, we decided to apply one more test, called [Paleomagnetic](#) dating. This method involves measuring the polarity of magnetic minerals within rocks to determine if the rocks were deposited at a time in the past when the Earth's magnetic field was the same as it is now or reversed. The paleomagnetic results provided additional confirmation of our dates for the fossils. Finally, to triple check our work and ensure that the dating results were reproducible, we sent replicate samples to different labs to independently, or "blind", date each of the different samples.

As a result, we now confidently know that *Homo naledi* is between 335,000 and 236,000 years old (5), which is much younger than what most scientists expected (8, 9). Initial age estimates for *Homo naledi* ranged from 2 million to 912,000 years old, which shows that great care should be taken when estimating an age only

from the morphology of the skeleton. *Homo naledi* demonstrates that hominin evolution is full of surprises.

A surprising result of this study is that the new dates demonstrate that *Homo naledi* was alive at the same time as the earliest members of our own species (*Homo sapiens*) in Africa. This poses a number of thought-provoking questions, such as: could *Homo naledi* have interacted with our own species? Early Middle Stone Age tools have always been attributed to *Homo sapiens*, in part because no other hominins were known to have coexisted with early humans in Africa. Could *Homo naledi*, a small-brained hominin, have been capable of tool production or use? The young age of *Homo naledi* requires us to reconsider what we think we know.

When the discovery of *H. naledi* was first announced, a research team (4) suggested that the individuals could have been placed or disposed of in the chamber on purpose; leading to speculation that this species may have been capable of symbolic behavior and have had access to the controlled use of fire for light. The presence of *H. naledi* fossils in the Lesedi Chamber (6), another deep and largely isolated cave chamber, provides more evidence to support this contested hypothesis (3, 6).

Did *Homo naledi* and *Homo sapiens* interact? Was *Homo naledi* one of our ancestors? Our newfound knowledge about *Homo naledi*, paired with robust dates, allows us to question long-held assumptions about human evolution.

#### References:

(1)

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