



Jason Heaton and Ronald Clarke, in cooperation with the Ditsong Museum of Natural History.

Four different *Australopithecus* crania that were found in the Sterkfontein Caves, South Africa. The Sterkfontein cave fill containing these and other *Australopithecus* fossils was dated to 3.4 to 3.6 million years ago, far older than previously thought. The new date overturns the long-held concept that South African *Australopithecus* is a younger offshoot of East African *Australopithecus afarensis*.

Sterkfontein Caves 1 million years older than thought

New dates for Australopithecus-bearing Sterkfontein Cave deposit places South African hominin fossils at the centre of global palaeo research.

Fossils found at the Sterkfontein Caves in South Africa reveal nearly four million years of hominin and environmental evolution. Since research began at the site in 1936 with the discovery, by Robert Broom, of the first adult hominin of the genus *Australopithecus*, it has become famous for the hundreds of *Australopithecus* fossils yielded from excavations of ancient cave infills, including iconic specimens such as the cranium known as Mrs. Ples and the Little Foot skeleton.

The majority of Sterkfontein's wealth of *Australopithecus* fossils has been excavated from an ancient cave infill called 'Member 4' – the richest deposit of *Australopithecus* fossils in the world. Over the last 56 years of Wits-led research at Sterkfontein, the age of Member 4 at Sterkfontein has remained contested, with age estimates ranging from as young as about 2 million years ago, younger than the appearance of our genus *Homo*, back to about 3 million years.

New research presented in a paper published in the journal *PNAS* re-evaluates the age of *Australopithecus* from Member 4 at Sterkfontein together with the Jacovec Cavern, which contains a few additional hominin fossils in a deeper chamber in the cave.

"The new ages range from 3.4-3.6 million years for Member 4, indicating that the Sterkfontein hominins were contemporaries of other early *Australopithecus* species, like *Australopithecus afarensis*, in east Africa," says Prof. Dominic Stratford, director of research at the caves, and one of the authors on the paper.

The new ages are based on the radioactive decay of the rare isotopes aluminum-26 and beryllium-10 in the mineral quartz. "These radioactive isotopes, known as cosmogenic nuclides, are produced by high-energy cosmic ray reactions near the ground surface, and their radioactive decay dates when the rocks were buried in the cave when they fell in the entrance together with the fossils," says Prof. Darryl Granger of Purdue University in

the United States and lead author on the paper.

Previous dating of Member 4 has been based on dating calcite flowstone deposits found within the cave fill, but careful observations show that the flowstone is actually younger than the cave fill and so it underestimates the age of the fossils.

"This re-assessment of the age of Sterkfontein Member 4 *Australopithecus* fossils has important implications for the role of South Africa on the hominin evolution stage. Younger hominins, including *Paranthropus* and our genus *Homo* appear between about 2.8 and 2 million years ago. Based on previously suggested dates, the South African *Australopithecus* species were too young to be their ancestors, so it has been considered more likely that *Homo* and *Paranthropus* evolved in East Africa," says Stratford.

The new dates show that *Australopithecus* existed at Sterkfontein almost a million years prior to the appearance of *Paranthropus* and *Homo*, providing more time for them to evolve here, in the Cradle of Humankind, and placing the hominins from this site front and centre in the history early of human evolution.

"This important new dating work pushes the age of some of the most interesting fossils in human evolution research, and one of South Africa's most iconic fossils, Mrs Ples, back a million years to a time when, in east Africa, we find other iconic early hominins like Lucy," says Stratford.

"The redating of the *Australopithecus*-bearing infills at the Sterkfontein Caves will undoubtedly re-ignite the debate over the diverse characteristics of *Australopithecus* at Sterkfontein, and whether there could have been South African ancestors to later hominins," says Granger.

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