

Prehistoric ear bones could lead to evolutionary answers

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Tiny ear bones (from left) the incus, stapes, and malleus could provide big clues to human evolution. Credit: Texas A&M

The tiniest bones in the human body – the bones of the middle ear – could provide huge clues about our evolution and the development of modern-day humans, according to a study by a team of researchers that include a Texas A&M University anthropologist.

Darryl de Ruiter, a professor in the Department of Anthropology at Texas A&M, and colleagues from Binghamton University (the State University of New York) and researchers from Spain and Italy have published their work in the current issue of *PNAS (Proceedings of the National Academy of Science)*.

The team examined the skull of a hominin believed to be about 1.9 million years old and found in a cave called Swartkrans, in South Africa. Of particular interest to the team were bones found in the middle ear, especially one called the malleus. It and the other ear bones – the incus and the stapes – together show a mixture of ape-like and human-like features, and represent the first time all three bones have been found together in one skull.

The malleus appears to be very human-like, the findings show, while the incus and stapes resemble those of a more chimpanzee-like, or ape-like creature. Since both modern humans and our early ancestors share this human-like malleus, the changes in this [bone](#) must have occurred very early in our evolutionary history.

"The discovery is important for two reasons," de Ruiter explains.

"First, ear ossicles are fully formed and adult-sized at birth, and they do not undergo any type of anatomical change in an individual lifetime. Thus, they are a very close representation of genetic expression. Second, these bones show that their hearing ability was different from that of humans – not necessarily better or worse, but certainly different.

"They are among the rarest of fossils that can be recovered," de Ruiter adds.

"Bipedalism (walking on two feet) and a reduction in the size of the canine teeth have long been held to be 'hallmarks of humanity' since they

seem to be present in the earliest human fossils recovered to date. Our study suggests that the list may need to be updated to include changes in the malleus as well."

de Ruiter recently authored a series of papers in Science magazine that demonstrate the intermediate nature of the closely related species, Australopithecus sediba, and provide strong support that this species lies rather close to the ancestry of Homo sapiens. The current study could yield additional new clues to human development and answer key questions of the [evolution](#) of the human lineage.

More information: Early hominin auditory ossicles from South Africa, www.pnas.org/cgi/doi/10.1073/pnas.1303375110

Provided by Texas A&M University

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