

GEOSCIENCES

# HIGHER KNOWLEDGE

## Lanzhou geologists reveal migration story from jawbone found at soaring altitude.

A single jawbone found in a cave high in the Tibetan Plateau has challenged archaeologists' understanding of human migration and evolution. An international team of researchers led by Lanzhou University geologist, Chen Fahu, reported that the Xiahe mandible, named after the county it was found, was dated to around 160,000 years ago, and came from a Denisovan, a lineage of hominins first described in 2010. Prior to the discovery, a few bone fragments and DNA sequences found at the Denisova Cave in the Altai Mountains, Russia, were all that had been recovered of this mysterious group.

Because DNA could not be extracted from the mandible, researchers used an innovative technique known as paleo-proteomic analysis. Ancient proteins were extracted from a well-preserved molar and matching amino acid sequences classified the bone as Denisovan.

The mandible was discovered in Baishiya Karst Cave in 1980 at an exceptionally high altitude of 3,280 metres, compared to the low altitude of Denisova Cave (700 metres). This is the earliest evidence of a high-altitude presence of humans on the Tibetan Plateau, pushing back previous estimates by 120,000 years.

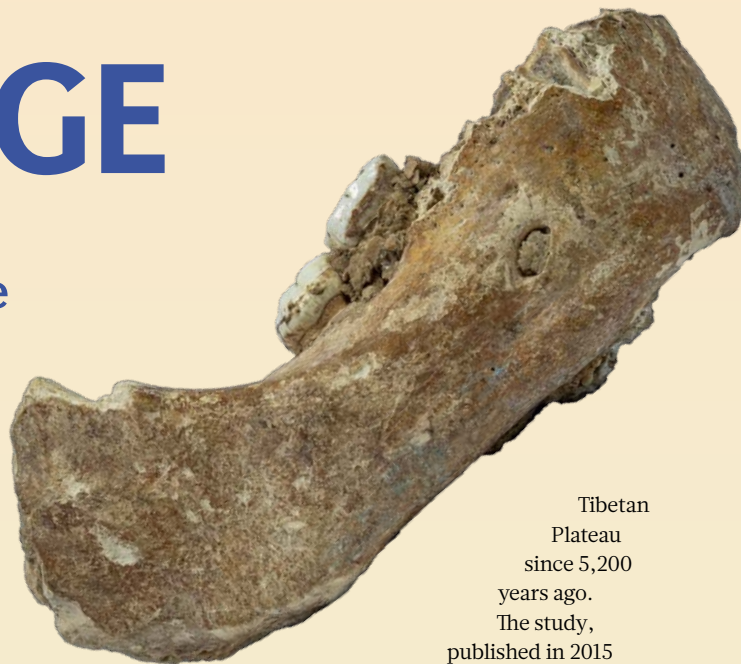
The findings, published in *Nature*, indicate that Denisovans were more widespread than originally thought, successfully populating the Tibetan Plateau before modern humans. It is possible that the Denisovans were adapted to live in

the high-altitude, low-oxygen conditions of the region, as early as in the penultimate glacial period, and researchers suspect this genetic trait may have been passed on to modern Tibetan populations.

More recently at Baishiya Karst Cave, the excavating team, led by Chen's LZU colleague, Zhang Dongju, also found abundant Palaeolithic stone artefacts and various species of animal bones with cut marks on their surfaces, potentially providing additional important information on Tibetan Denisovan behaviour.

The LZU environmental archaeology team, since its establishment in the 1990s, by Chen, who is a member of the Chinese Academy of Sciences, has an enviable track record of high-impact publications, with more than 80 research papers published in renowned academic journals, including *Science*, *Nature*, *PNAS* and *Quaternary Science Reviews*. The team focuses on questions concerning the migration and adaptation of prehistoric humans on the high Tibetan Plateau. Beyond the Xiahe mandible studies, the group also reported on the spread of agriculture and permanent human occupation on the

The Xiahe mandible, found in Baishiya Karst Cave, was classified as Denisovan through paleoproteomic analysis.



Tibetan Plateau since 5,200 years ago. The study, published in 2015 in *Science*, was the

result of archaeological and archaeobotanical investigation of more than 200 prehistoric sites in the north-eastern Tibetan Plateau. In 2017, the team was awarded the first class award of Natural Sciences by the Ministry of Education for this study and their work was recognized as one of the top 10 scientific and technological progresses by Chinese universities in 2015.

In 2016, the team also established the Center for Environmental Archaeology (CEA) to understand human interactions with environmental changes as different groups spread across Eurasia in the prehistoric period.

They also study cultural communications between East and West in the Neolithic period, along with the formation and evolution of the ancient Silk Road. Their findings provided crucial scientific evidence during the implementation of the national 'Belt and Road' strategy to help inform decisions. ■