

Fossil discovery in China raises intriguing questions for human evolution

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Analysis of a jawbone in the Hualongdong cave in eastern China dated at 300,000 years old has shown an intriguing array of features both archaic and modern. The nearly complete mandible together with a partial cranium has overall been labelled HLD 6.

The analysis was presented in an important paper by Professor Xiujie Wu, at the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP) at the Chinese Academy of Science in Beijing, and her team, published in July in the *Journal of Human Evolution*: “Morphological and morphometric analyses of a late Pleistocene hominin mandible from Hualongdong, China.”

Wu *et al* wrote: “Results indicate that the HLD 6 mandible exhibits a mosaic morphological pattern characterized by a robust corpus [body of the mandible] and relatively gracile symphysis [mandible median line marked by a thin ridge] and Ramus [movable hinge on either side of head]. The moderately developed mental trigone [the overall structure of the lower jaw] and a clear anterior mandibular incurvation of the HLD 6 mandible are reminiscent of Late Pleistocene hominin and recent modern human morphology.”

In hominin evolution robust features are considered indicative of more archaic human forms, while gracile (delicate) features indicate modern evolutionary traits.

Analysis of the fossil’s cranium published in 2021 showed a similar combination of archaic and more modern features.

“I’ve come across some materials about this latest finding, and couldn’t agree more on believing this finding can show the tendency, and a time point, that since 300,000 years ago, there was a transition that East Asian man experienced evolving from ancient to modern man,” a paleontologist Wang Xiong told the *Global Times*. Scientists have speculated on the significance of these fossils for human evolution, they may represent a new

lineage entirely. How HLD 6 fits into the evolution of modern man, *Homo sapiens*, is not clear.

“The Hualongdong people could represent a previously unknown ancestor or close relative of early *Homo sapiens*,” a palaeoanthropologist who was part of the team led by Xiujie Wu told *Nature*.

The Hualongdong cave, located in the Dongzhi county of the west China province of Anhui, is an important fossil site. Scientists have been investigating there since 2013. Earlier fossil finds included a *Homo erectus* skull named Dongzhi man, described in 2015, identified from two skull fragments and two teeth. It is between 150,000 and 412,000 years old. Scientists unearthed human bone fragments belonging to at least 16 individuals, including a child approximately 12 to 16 years old and numerous stone tools. Along with the human artefacts, 6,000 fossils of vertebrate animals, including stegodon (an elephant ancestor), giant tapir and giant pandas were discovered. The animal fossils show signs of cut marks indicating human butchery.

“Together with the animal bone fossils and the stone implements, we assume the site was the home for a relatively mature human community,” the IVPP researcher in charge of the excavation, Liu Wu, told the *People’s Daily*.

H. erectus is thought to have originally evolved 2 million years ago. The species is one of the most widespread, with fossils found in Africa and across the Eurasian landmass to China and southeast Asia (Java man). The species is thought to have become extinct 117,000 years ago, based on a fossil found in Ngandong, Java in 2019.

Previously the hominin fossils from this period were considered as intermediate between *Homo erectus* and *Homo sapiens* but the plethora of Chinese discoveries is challenging this view.

“The hominin fossil discovery and related studies in the

last decade have changed this traditional view on the evolution pattern of the late Middle Pleistocene hominins in China radically,” Wu and her team stated. “The hominin fossils from this time period, such as Dali, Jinniushan, Maba, Tongzi, Xujiayao, Xuchang, and Xiahe, exhibit high morphological variability and are not easily allocated to the existing taxonomic groups.”

All the fossils mentioned were discovered in China and are intermediate between *H. erectus* and *H. sapiens*, but not enough information is available to characterise their species denomination. Clearly the late to middle Pleistocene was a period of great flux in human evolution.

Dali man, comprising of an entire fossilised skull of a young male, a typical representative of this period, was discovered by a geologist from the Shaanxi Bureau of Geology and Mineral Resources, Liu Shuntang, in 1978 in Dali County, Shaanxi province, China. It is 209,000 years old.

A paper published in 1981 in *Scientia Sinica* by palaeontologist X. Z. Wu describes “a well-preserved cranium of an archaic type of early *Homo sapiens* from Dali, China.” Wu analysed that “It has many characters identical to those of early *Homo sapiens* or intermediate between *Homo erectus* and modern man. It possesses also some features similar to those of modern man, and close to *Homo erectus* in some respects. So it probably belongs to an archaic type of early *Homo sapiens*.”

An article published in *Nature* in September drew parallels with fossil remains discovered at the Jebel Irhoud archaeological site in Morocco, found during the early 2000s, that may provide insights into the significance of HLD 6 and the other undesignated Chinese fossils.

The Jebel Irhoud human remains are thought to belong to one of the earliest members of the evolutionary lineage that includes *Homo sapiens*. Jebel Irhoud is a cave located 50 km southeast of the city of Safi. It is an important paleontological site discovered in 1960 where several human fossils have been unearthed, as well as a stone tool industry and the remains of several animal species indicative of a steppe ecosystem.

The fossils were originally dated as 40,000 years old and were classified as Neanderthals, but more accurate work at the site dated the fossils as 300,000 years old. A skull designated as Jebel Irhoud-1 is considered the most important find.

In a comment by professor of anthropology at the Natural History Museum in London Chris Stringer and anthropologist at New York University Julia Galway-

Witham in *Nature* in June 2017, “On the origin of our species,” stated that the “approximately 350,000–280,000-year-old fossils from Jebel Irhoud in Morocco that could represent an early stage in *Homo sapiens* evolution. The facial shape of a Jebel Irhoud fossil previously discovered at the site shows similarities to the structure of more modern humans, such as the presence of delicate cheekbones. However, the shape of the braincase (the section of the skull enclosing the brain) is archaic in form, and has an elongated shape that is less globular than the structure of more modern *H. sapiens*.”

The emergence of modern humans was a very complex and contradictory process. The first fossil considered to represent true humans, Herto Man discovered in 1997 in Ethiopia, is 160,000 years old. Yet genetic evidence suggests that humans may have emerged at least 500,000 years ago.

Stringer and Galway-Witham continued that these findings “suggest that clear-cut boundaries in *H. sapiens* evolution, such as the descriptions of fossils as ‘archaic’ or ‘anatomically modern’, are likely to fade as the fossil record improves. They are probably right, although their evidence adds to the picture of an extended temporal overlap of archaic and more-modern-looking forms across the continent (Africa)...”

A paleoanthropologist at the National Research Center On Human Evolution in Spain, Maria Martín-Torres, who was involved in the analysis of HLC-6, told *Nature*, “More fossils and studies are necessary to understand [the Hualongdong people’s] precise position in the human family tree.” She pointed out that proteins extracted from bones could shed further light on how the Hualongdong people are related to modern humans, as well as to more archaic species.

The hominin fossils from China will play a critical role in the elaboration of how modern humans evolved.



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