

Intact hominid skull found in China offers insights into human evolution

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The announcement in November of the discovery of what appears to be a near-intact hominid skull in China is a stunning discovery. It has the potential of further revealing the complex intricacies of human evolution particularly in China and the Eurasian landmass more generally. Complete hominoid skulls are a rare find and can offer an important opportunity to gain further insights into human evolution.

The discovery of a near-intact hominid skull should be welcomed, as its analysis will further add to our knowledge of humanity's complex evolutionary history.

The skull is named Yunxian 3 as it was discovered 20 kilometres west of Yunyang, formerly known as Yunxian, in central China's Hubei province. It was found on 18 May 2022, 35 meters from two other skulls, known as Yunxian Man or Yunxian 1 and 2, discovered in 1989 and 1990 respectively. The excavation site is known as Xuetangliangzi in the city of Shiyan's Yunyang district.

The Yunxian site is located on a terrace on the Han River, a tributary of the Blue River in the Hubei Province, at 550km north-east of Wuhan and 40km west of Yunxian.

Yunxian 3 was found half buried in an upright position. So far scientists have revealed the forehead, including the brow ridge and eye sockets, as well as the top, back and left cheekbone of the skull. Gao Xing, paleoanthropologist at the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing, told *Nature* that it is not known if the teeth and the lower jawbone are still present. Gao Xing is excavating the skull.

'No obvious deformation has been found. It is in very good condition and features the typical characteristics of *Homo erectus*,' Gao told the *Global Times*.

Fieldwork is currently underway to fully excavate the skull, which is a meticulous and laborious task. This will be followed by extensive analysis to extract as much information as possible.

'It's a wonderful discovery, unlike those earlier discoveries, which were crushed and distorted after millennia underground, the third skull, Yunxian 3, seems to be in good condition,' palaeoanthropologist at the National Museum of Natural History in Paris Amélie Vialet, who worked on the Yunxian 2 skull, told *Nature*.

The earlier discoveries were dated at between 1.1 million and 800,000 years old using sediments and nearby fossils. Dating was done using Uranium series and Electronic Spin Resonance on some teeth of the Yunxian fauna.

'Preliminary studies showed that the No 3 skull should belong to the same period of time as the No 1 and No 2,' Gao said.

Based on Vialet's three dimensional analysis of Yunxian 2, the skulls are considered to be members of the archaic hominid species *Homo erectus*. It is highly likely the current discovery is of the same species.

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.

Eugene Dubois discovered the first *H. erectus* fossil in Java in 1891. It was originally dubbed *Pithecanthropus erectus* or upright ape man.

Scientists think *H. erectus* was relatively large, probably standing about 1.5m tall. The brain size was

about 800 cubic centimetres, about 60 percent smaller than modern humans, but 50 percent larger than the earlier australopiths. They were one of the first humans to walk upright and had modern body proportions, such as long legs and shortened arms adapted for a life out of the trees.

They were technologically adept, with a sophisticated tool kit known as Acheulean stone tools, consisting of hand axes and blades. *H. erectus* had the ability to control fire.

H. erectus had a more diverse diet than its predecessors, which meant its teeth were smaller, as they didn't require robust chewing adaptations, giving it a more gracile face.

Because of the widespread nature of *H. erectus* and its long existence, it is considered a highly variable species across its range.

Vialet told *Nature* that the "Yunxian 1 and 2 skulls share some features with older Javanese fossils, and others with younger *Homo erectus* fossils from mainland Asia. Like the Javanese fossils, they are large, big-brained skulls." But, she says that they are "less heavily built, a characteristic that usually indicates a more modern individual."

Scientists consider the Chinese populations of *H. erectus* to be highly variable. It is not known if this is due to each population evolving independently, or successive waves occurring out of Africa.

Palaeoanthropologist at Shandong University Yameng Zhang said, "More complete Chinese *H. erectus* like Yunxian 3 are crucial to answer this question."

Vialet is currently comparing Yunxian 2 to European hominid populations to see whether the Chinese specimen could be similar. She told *Nature* that Yunxian 3 should be compared with Chinese as well as European hominid fossils, such as the 1.4-million-year-old face from the Sima del Elefante cave in Atapuerca, Spain.

A jawbone fragment discovered in northern Spain on June 30 is considered to be the oldest hominid fossil discovered in Europe so far. It has been estimated as 1.4 million years old. Scientists have identified it as a new species, *Homo antecessor*, that evolved from *H. erectus* and may have been an ancestor of Neanderthals and modern humans. A comparison with Yunxian 3, if its jaw bone is found intact, will be critical.

Scientists think that *H. erectus* originated in Africa about 2 million years ago, probably from an australopith or early *Homo* species, and then migrated across the Eurasian landmass to Asia and southeast Asia. Paleoanthropologists studying *H. erectus* think that it may be an ancestral species to modern humans, *H. sapiens*.

Although the African and Asian *H. erectus* specimens have been designated into one species, their relationship is still very controversial.

A comment published in *Nature Education Knowledge Project* in 2013 by Professor Adam Van Arsdale at the Department of Anthropology, Wellesley College, put forward a possible classification of *H. erectus*. Some scientists consider the species restricted to eastern and southeast Asia, with fossils from the Lower Pleistocene through the Middle Pleistocene, dated at approximately 1.4 to 0.2 million years ago. Earlier fossils from (Caucasian) Georgia and Africa that have similarities to the eastern and Southeast Asian *H. erectus*, but also have more primitive traits, are designated as *Homo ergaster*. While fossils from the Middle Pleistocene (1.25 to 0.7 million years ago) found in Europe are classified as *Homo heidelbergensis*.

"Our current findings have shown that human evolution in East Asia was continuous. The links between *Homo erectus* and later *Homo sapiens* are still unclear, but this issue is a key to decoding the origins of modern human beings in East Asia. Indisputably, the skull fossil can provide crucial evidence," Gao said.



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