

# New look at human fossil suggests Eastern Europe was an important pathway in evolution

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A partial lower jaw, unearthed in a Serbian cave in 2006, has been securely dated to be at least 397,000 years old, and could be older than 525,000 years. Credit: Mirjana Roksandic, University of Winnipeg

A fossilized bone fragment found buried deep in the soil of a Serbian cave is causing scientists to reconsider what happened during a critical period in human development, when the strands of modern humanity were still coming together.

The partial lower jaw, originally unearthed in 2006, could at first only be established to be older than 130,000 years. Evidence suggested it could be much older, but no one could prove it until now. The new findings appear in the online, open-access journal [PLOS ONE](#).

The fragment is now securely dated to be at least 397,000 years old and could even be older than 525,000 years. The conclusion follows new testing and analysis by an international team including three researchers from Canadian universities, who were funded by the Natural Sciences and Engineering Research Council of Canada: dating specialist and [earth scientist](#) Jack Rink of McMaster's School of [Geography](#) & Earth Sciences, physicist Jeroen W. Thompson of McMaster's Department of Medical Physics and Applied Radiation Sciences, and paleoanthropologist Mirjana Roksandic from the University of Winnipeg.

They worked with partners from France, England and Serbia, including Dušan Mihailović of the University of Belgrade. The university has been excavating the site since 2004.

The new dating – using three technologies (electron spin resonance, uranium series isotopic analysis and infrared luminescence dating) – establishes the mandible as the easternmost European fossil of its age, sharing far more in common with African and Asian fossils than with contemporary examples from western Europe.

"This is opening up the window to study eastern Europe as an important place in human evolution. It's important to all the modern European evolution that comes after that," Rink says. "This fossil being so old and coming from that place links it to fossils that came out of Africa not long before that, in the context of human development."

The electron spin resonance analysis was carried out in Rink's laboratory

and at the McMaster Nuclear Reactor.

The finding is significant because the fossil is distinct from its western contemporaries, suggesting it comes from the time before receding glaciers made it possible for isolated populations of primitive humans in western Europe to mingle with their counterparts from Asia and Africa to form a complex hybrid representing many regions and periods.

The fossil lends weight to the suggestion that the Balkan Peninsula could have been a gateway involved in the movement of populations from Asia to Europe.

"During this time, humans in western Europe started to develop Neandertal traits, which are lacking in this specimen," Roksandic says. "Humans in southeastern Europe were never geographically isolated from Asia and Africa by glaciers and accordingly, this resulted in different evolutionary forces acting on early human populations in this region."

Dating specialists from the research team independently visited the Balanica cave complex in southern Serbia to gather the data they used to reach their common conclusions.

The new dating places the jawbone fragment solidly in the early part of the Middle Pleistocene era, which lasted from 780,000 to 130,000 years ago. It was a period of changing ice cover and rapid human development when early humans were beginning to make effective defensive and predatory weapons and to control fire for their own use.

The physical characteristics, or morphology, of the jawbone and teeth are consistent with the period, says Roksandic, who studied the shape of the bone and the alignment and configuration of the teeth.

The new finding suggests there is valuable evidence to be found elsewhere in southeastern Europe, which could fill in missing pieces of the puzzle.

**More information:** [dx.plos.org/10.1371/journal.pone.0054608](https://doi.org/10.1371/journal.pone.0054608)

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