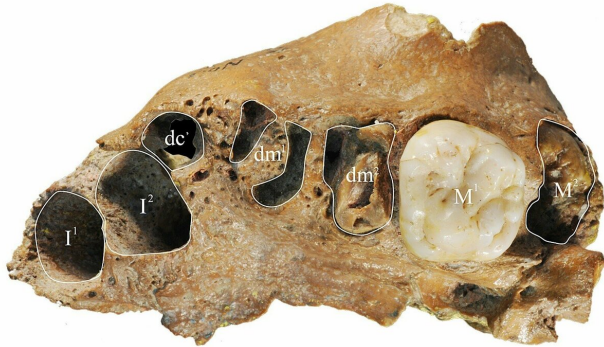


An ancient relative of humans shows a surprisingly modern trait

16 January 2019, by Jeff Grabmeier



The original Xujiayao fossil. Credit: Song Xing, Chinese Academy of Sciences

A relative of modern humans that lived at least 104,000 years ago in northern China showed evidence of dental growth and development very similar to that of people today, a new study found.

An international team of scientists performed the first systematic assessment of dental growth and [development](#) in an East Asian archaic hominin fossil that is known as the Xujiayao juvenile.

The fossil is of a 6 1/2-year-old who lived between 104,000 and 248,000 years ago found at the Xujiayao site in northern China.

The researchers were surprised to find that in most ways, this child's dental development was very similar to what you would find in a child today, said Debbie Guatelli-Steinberg, co-author of the study and professor of anthropology at The Ohio State University.

"The Xujiayao juvenile is the oldest fossil found in east Asia that has dental development comparable to modern humans," Guatelli-Steinberg said.

"It may suggest that these archaic humans had a slow life history like modern humans, with a prolonged period of childhood dependency."

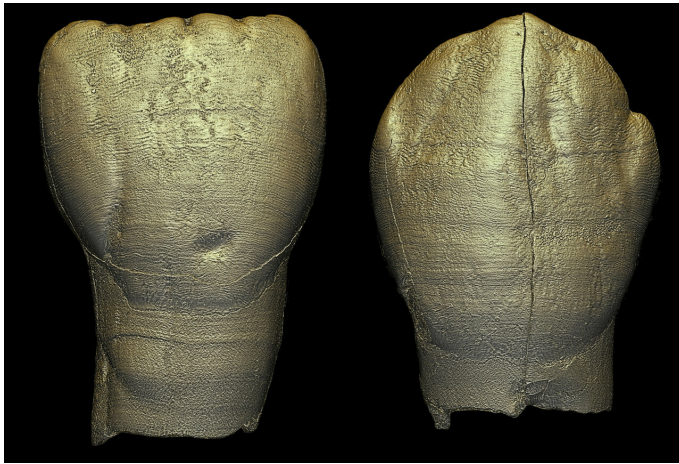
The study was published today (1-16-19) in the journal *Science Advances*.

Teeth provide some of the best data anthropologists have about the growth and development of our ancient ancestors, she said. That's because growth lines in [teeth](#) retain a record of dental development.

Compared to our primate cousins, modern humans—including their teeth—take a long time to form and develop. Anthropologists believe this characteristic is associated with humans' longer periods of child dependency—how long a juvenile relies on support from a caregiver.

Among other techniques, the researchers used synchrotron X-ray imaging to look inside the fossil to see the internal structure of the teeth, including growth lines that revealed the rate of tooth development.

The results were surprising in part because so many other features of this hominin are not modern, such as the shape and thickness of the skull and the large size of the teeth, according to the researchers.



The buccal view of the Xujiayao incisor and canine showing the pattern of perikymata distribution. Credit: Song Xing and Paul Tafforeau

"We don't know exactly where this enigmatic East Asian hominin fits in human evolution," said Song Xing, lead author of the study, who is at the Chinese Academy of Sciences in Beijing.

"It has some affinities to archaic [human](#) relatives like the Denisovans and Neanderthals with, as we found, some more modern features. It is a strange mosaic."

Using the growth lines in the teeth, the researchers estimated the death of the Xujiayao juvenile at about 6 1/2 years of age, said study co-author Mackie O'Hara, a graduate student in anthropology at Ohio State.

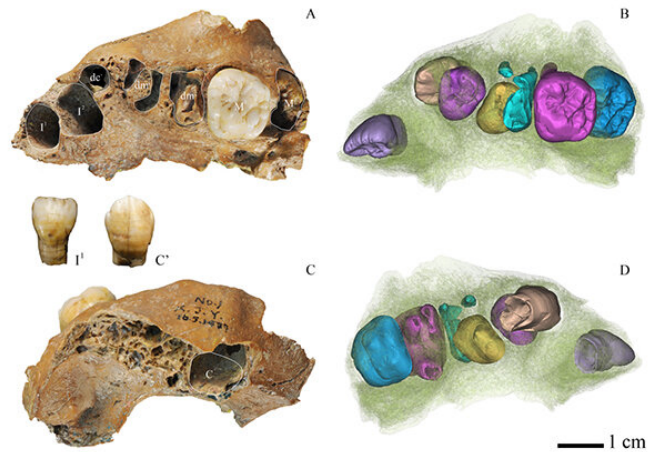
The first molar of this juvenile—what we call the 6-year-molar today—had erupted a few months before death and had started to wear a bit. The root was about three-quarters complete, similar to humans today.

"We found that this juvenile was growing up—at least dentally—according to a schedule similar to that of modern people," O'Hara said.

Another aspect that was similar to modern humans was the perikymata, which are the incremental growth lines that appear on the surface of the tooth.

"We found that the way these perikymata were distributed on the Xujiayao juvenile teeth was close

to what we see in modern humans, and not to Neanderthals," Guatelli-Steinberg said.



The the *Xujiayao maxilla* (left) and three-dimensional (3D) reconstruction of the teeth (right). Credit: XING Song

Another interesting finding related to the long-period growth line, which is laid down about every eight days in modern humans.

"This juvenile had a 10-day rhythm, which you don't see very often in early hominins," she said. "Most of the early hominins had a shorter rhythm, closer to seven days. This is another aspect that is much more modern."

The one aspect of dental development in the Xujiayao juvenile that was not modern was the rate of growth in the roots of the teeth. Here, the juvenile showed relatively fast growth, compared to a slower growth in modern humans.

While the dental development of this juvenile suggested it had a slow life course similar to modern humans, Guatelli-Steinberg cautioned that we don't know what happens in later childhood in hominins like this one.

"It would be interesting to see if dental development in later childhood, such as the growth and development of third molars, was also similar to

[modern humans](#)," she said.

More information: S. Xing et al., "First systematic assessment of dental growth and development in an archaic hominin (genus, Homo) from East Asia," *Science Advances* (2018). DOI: 10.1126/sciadv.aau0930 , advances.sciencemag.org/content/5/1/eaau0930

Provided by The Ohio State University

APA citation: An ancient relative of humans shows a surprisingly modern trait (2019, January 16) retrieved 25 May 2019 from <https://phys.org/news/2019-01-ancient-relative-humans-surprisingly-modern.html>

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