

Tooth development and weaning in chimpanzees not as closely related as once thought

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Image: Wikipedia.

For more than two decades, scientists have relied on studies that linked juvenile primate tooth development with their weaning as a rough proxy for understanding similar developmental landmarks in the evolution of early humans. New research from Harvard, however, is challenging those conclusions by showing that tooth development and weaning aren't as closely related as previously thought.

Using a first-of-its-kind method, a team of researchers led by professors Tanya Smith and Richard Wrangham and Postdoctoral Fellow Zarin Machanda of Harvard's Department of [Human Evolutionary Biology](#) used high-resolution [digital photographs](#) of [chimps](#) in the wild to show that after the eruption of their first molar tooth, many juvenile chimps continue to nurse as much, if not more, than they had in the past. Their study is described in a January 28 paper in the [Proceedings of the National Academy of Sciences](#).

"When these earlier studies were published about 20 years ago, they found a very tight relationship between the eruption of the first molar and certain [developmental milestones](#), particularly weaning," Smith explained. "A number of researchers have tried to extrapolate that relationship to the human fossil record, but it now appears that our closest living relative doesn't fit that pattern. That suggests we should be more cautious if we want to infer what juvenile [hominins](#) were like."

Getting an inside view of chimpanzee childhood, however, is no easy task.

Most prior studies of [tooth development](#) in juvenile chimps relied on two methods of collecting data – observing [captive animals](#) or studying [skeletal remains](#) of wild primates. Both, however, also came with challenges for researchers.

Studies have shown that captive chimps grow dramatically faster – often reaching adult size by age 10 or 11, compared to 13 to 15 for wild chimps. That early development means the milestones researchers rely on as proxies for understanding early [human species](#) likely occur earlier than they normally would. Researchers studying skeletal remains of wild primates face a similar challenge. To properly understand those developmental landmarks, remains must be properly identified and aged, a notoriously difficult process for primates in dense tropical forests.

To solve those problems, Smith, Wrangham and Machanda developed a unique method for studying juvenile chimps in the wild. Researchers studying the Kanyawara chimpanzee community in Kibale National Park in Uganda teamed up with wildlife photographers who snapped photos of juvenile chimp's teeth whenever they opened their mouths. The detailed photos, some of which captured the same individuals over months, allowed researchers to track precisely when molars erupted, and to correlate that information with chimp's behavior more closely than ever before.

What the images revealed, Smith and Machanda said, came as a surprise.

Where earlier studies suggested that juvenile primates were weaned shortly after their first molar erupts, their study showed that, in addition to eating more solid food, chimps continued to "suckle as much, if not more, than they had before," Smith said. "They were showing adult-like feeding patterns while continuing to suckle, which was unexpected."

While questions of why juvenile chimps continue to nurse – in some cases for months – have yet to be answered, Machanda said those questions will likely be the subject of future studies.

"We're now working on a project that's focused on body size and growth, but we're also planning future studies that will look at their energetic condition so we can understand what they're trying to get from the mother by continuing to nurse," she said. "What's interesting, however, is that there can be conflict surrounding this where the juveniles are trying to get as much as possible from the mother and the mother is actually covering up her nipples and moving around. Sometimes they'll even throw these temper tantrums that look exactly like human babies."

"I think there are two bottom lines here," Smith said. "One, I think, is a

cautionary tale. The findings in this paper are going to challenge us to find other proxies for weaning and the spacing between offspring, but the other aspect that's exciting is that we have some suggestion that we should start looking at how feeding behaviors develop in the wild.

"No one has looked at how infants become more adult-like, both in their food choice and in the time they spend feeding," she continued. "This actually appears to correlate fairly well with dental development, so, while this is a preliminary finding, we may have a new anatomical proxy for when juvenile primates begin eating like adults."

More information: "First molar eruption, weaning, and life history in living wild chimpanzees," by Tanya M. Smith et al. *PNAS*, 2013.

Provided by Harvard University

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