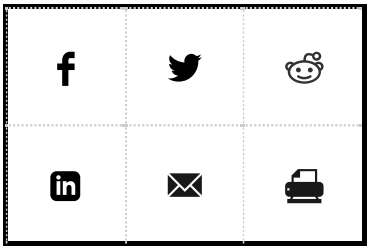
Observations

Was "Ardi" not a human ancestor after all? New review raises doubts

By Katherine Harmon on February 16, 2011



Genetic findings often underscore the notion that organisms with similar-looking body parts aren't always close evolutionary relatives. Wings for flying or sharp teeth for ripping into food can be the result of convergent evolution, in which natural selection results in similar-looking solutions to problems faced by different species—whether they are distantly or closely related.

Teasing apart the origins of shared features in closely related species is especially tricky, especially when DNA clues are not available. So when researchers spy skeletal similarities in the fossil record, they might be led to believe that species "are more closely related than they really are," wrote the authors of a new review paper. For example, rather than indicating a direct link to modern humans, the familiar features of some purported human ancestors, including *Ardipithecus ramidus*, might be explained by convergent evolution.

"We could actually place *Ardipithecus* in a lineage that's unrelated to humans," Terry Harrison, of the Center for the Study of Human Origins at New York University and co-author of the paper, said in a podcast with *Nature* (*Scientific American* is part of Nature Publishing Group).

The 4.4-million-year-old "Ardi" might have split off from the main stems of the ancient ape family tree before the last common ancestor linking humans and chimps, which is thought to have lived between eight million and four million years ago, Harrison and Bernard Wood, of George Washington University's Center for the Advanced Study of Hominid Paleobiology, noted in their new review paper, published online February 16 in *Nature*.

"I think it's equally likely, or perhaps even preferable, that it is an ancestral form or an early representative of the African great ape" group—that "it's not necessarily uniquely linked to humans," Harrison said of *Ardipithecus* in the podcast.

Some of the most solid evidence for Ardi being included in the hominin branch is her small canine teeth. But the researchers are quick to point out that other ancient non-hominin species, including *Oreopithecus* and *Ouranopithecus*, also came to have reduced canine teeth, "presumably as a result of parallel shifts in dietary behavior in response to changing ecological conditions," the researchers suggest in their article. "Thus, these changes are in fact, not unique to hominins."

The placement of a hole at the base of the skull, known as the foramen magnum, also might suggest Ardi as an upright walker, and thus perhaps a solid hominin. But in looking to other apes, "this feature is more broadly associated with differences in head carriage and facial length, rather than uniquely with bipedalism," Wood and Harrison note. Some extinct primates, such as *Oreopithecus bambolii*, evolved outside of the human line but nevertheless possessed similarly hominin-like traits, which, the authors write, "encourage researchers to generate erroneous assumptions about evolutionary relationships."

Wood and Harrison draw parallels to the decades-old case of the short-faced, small-canined *Ramapithecus punjabicus*, which was initially thought to be a hominin but later shown to be a female *Sivapithecus*, a relative of orangutans.

Part of the problem in trying to understand the ancestral ties among extinct species derives from assumptions about what the last common ancestor of humans and great apes looked like, including the classic fallacy that our predecessors looked like modern chimpanzees. "It is simplistic to assume that only hominins have undergone significant evolutionary change since the most recent common ancestor," Wood and Harrison note in their article. Key features, such as small canine teeth, that we take to be indicative of changing behavior in hominins, could have been useful in other far different primate lines as well. "It would be rash simply to assume that those features are immune from" convergent evolution, conclude the authors. They argue for "an alternative and perhaps more prudent" line of thinking that the path that led to humans was likely less "ladder-like" and rather "more bushy," full of evolutionary dead ends that branched out and died off before the human stem had taken hold. Such a model also suggests that finds such as *Ardipithecus* should not be thought of as human until more evidence is uncovered.

Tim White, of the University of California, Berkeley, and one of the lead authors on the 2009 Ardi papers, called the new article a "six page illustrated op-ed piece" in the *Nature* podcast. He maintains that "whole functional complexes"—not just individual characteristics—that were described in his team's papers link Ardi to humans "to the exclusion of the great apes."

Wood and Harrison do not dismiss *Ardipithecus* as a possible human ancestor, but they note that, "it remains to be seen how many of these alleged hominin synaphomorphies will withstand close scrutiny." They encourage other paleoanthropologists to "acknowledge the potential shortcomings of their data when it comes to generating hypotheses about relationships," and accept that with current fossil evidence and analysis, we might not be able to know for sure whether or not Ardi was a hominin.

"Fossils don't come with their birth certificates attached—they don't come with prognostications of their future," *Nature* editor Henry Gee, who edited the article, said in the podcast. "It's up to us to draw those inferences from the fossils."

Image of human and other primate skulls courtesy of Wikimedia Commons

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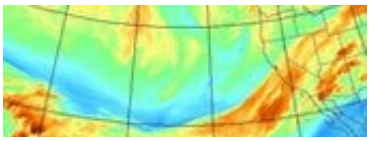

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