

Fossil discovery confirms “Lucy” walked upright

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A new 3.2 million-year-old fossil discovery at Hadar, Ethiopia shows that *Australopithecus afarensis*, an ancestor of modern humans, had arched feet and was “committed” to walking upright.

This is the conclusion of a team of scientists, Carol Ward of the University of Missouri and William Kimbel and Donald Johanson of the Institute of Human Origins at Arizona State University, who made a detailed study of a “nearly perfectly preserved” fossil of a fourth metatarsal foot bone of *A. afarensis*.^[1]

The species is thought to have existed between about 2.9 million and 3.7 million years ago, and this fossil is one of more than 360 hominin specimens found at Hadar, the site where the famous “Lucy” was found in 1974. Lucy was the first to be discovered and the most complete fossil skeleton of the species. Johanson was one of the original team that discovered Lucy, collecting a remarkable 40 percent of her skeleton. She was named Lucy as the Beatles’ song “Lucy in the Sky with Diamonds” played repeatedly on the tape recorder as the team celebrated their find.

Lucy was only 1.1 metres (3 ft., 7½ in.) tall, weighed 29 kg (64 lb.) and had a small brain, large canine teeth and projecting face that resembled an ape. However most of the bones from the neck downwards were similar to those of modern humans. It was known from this that she walked in an erect manner, but how much time the species spent on the ground walking and how much time was spent in the trees has been a disputed issue among paleoanthropologists.

Prior to the discovery of the metatarsal bone used in this recent study, the lack of complete foot bone fossils made it difficult to resolve the issue. In this investigation the scientists have compared the metatarsal bone with the same bone in humans as well as a gorilla and a chimpanzee, showing that its

geometry in all respects is far closer to that of the human.

Human feet differ considerably from other primates, being arched in both longitudinal and transverse directions. This has two consequences: firstly the ability to absorb the shock of the body mass when the foot hits the ground in walking; secondly forming a lever for the propulsion of the body forward in each stride.

The evidence now points strongly to *A. afarensis* walking and running in a similar way to contemporary humans, and not dividing its time between trees and open land. “I’m sure they went into trees sometimes, but they would not have been able to do this much better than you or I could,” Carol Ward told *Nature News*.

It would mean the species could move about more easily and quickly, opening up broader and more abundant supplies of food, the team said. “Lucy’s spine has the double curve that our own spine does,” Professor Kimbel told the BBC.

“Her hips functioned much as human hips do in providing balance to the body with each step, which in a biped of course means that you’re actually standing on only one leg at a time during striding.

“The knees likewise in Lucy’s species are drawn underneath the body such that the thighbone, or femur, angles inwards to the knees from the hip joints—as in humans.

“And now we can say that the foot, too, joins these other anatomical regions in pointing towards a fundamentally human-like form of locomotion in this ancient human ancestor.”

In their *Science* paper, the team point to the discovery of 3.6 million-year-old footprints that were discovered at Laetoli in Tanzania, showing signs of a longitudinal

arch. They point to the fact that although *A. afarensis* is the only hominin represented in fossil remains at the site, objections had been made to identifying the footprints with this species because of the lack of evidence of arched feet. Their work eliminates this objection.

Attempting to give an evolutionary trajectory to their investigation, they refer to the 4.4 million-year-old skeleton of the species *Ardipithecus ramidus*. First discovered, also in Ethiopia, in 1994, the relatively complete skeleton, nicknamed Ardi, was formally announced by paleontologists in 2009. Ardi could walk upright but retained adaptations in the foot for climbing trees and grasping. But “by at least 3.2 million years ago the fundamental attributes of human pedal anatomy and function were in place”, and it was “unlikely that selection continued to favour substantial arboreal behaviours.”

Various hypotheses have been put forward to explain why evolution favoured upright walking in the ancestors of humans and the issue is contentious among scientists in the field. However from the standpoint of Marxism, the position put forward by Charles Darwin, and never refuted, is the only one that is consistent with a scientific view of how human society later developed. In “The Descent of Man and Selection in Relation to Sex” Darwin wrote, “Man could not have attained his present dominant position in the world without the use of his hands, which are so admirably adapted to the act of obedience of his will.”

In the “Part Played by Labour in the Transition from Ape to Man”, Frederick Engels wrote that labour “is the prime basic condition for all human existence, and this to such an extent that, in a sense, we have to say that labour created man himself.” Walking upright was the decisive step in the transition from ape to man. “Before the first flint could be fashioned into a knife by human hands, a period of time probably elapsed in comparison with which the historical period known to us appears insignificant. But the decisive step had been taken, the hand had become free and could henceforth attain ever greater dexterity.... Thus the hand is not only the organ of labour, it is also the product of labour.”

1. Carol V. Ward et al., *Science*, vol. 331, 2011, pp. 750-53.



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