

8 October 2008
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Mother of man - 3.2 million years ago

(Lucy)



One fossil discovery above all has transformed views of how we became human. But who was Lucy, and why is she so important to human evolution?

Lucy was discovered in 1974 by anthropologist Professor Donald Johanson and his student Tom Gray in a maze of ravines at Hadar in northern Ethiopia.

Johanson and Gray were out searching the scorched terrain for animal bones in the sand, ash and silt when they spotted a tiny fragment of arm bone.

Discovery of a lifetime

Johanson immediately recognised it as belonging to a hominid. As they looked up the slope, they saw more bone fragments: ribs, vertebrae, thighbones and a partial jawbone.

They eventually unearthed 47 bones of a skeleton - nearly 40% of a hominid, or humanlike creature, that lived around 3.2 million years ago. Based on its small size, and pelvic shape, they concluded it was female and named it 'Lucy' after 'Lucy in the Sky with Diamonds', the Beatles song playing on the radio when Johanson and his team were celebrating the discovery back at camp.



Johanson and Gray named their fossil skeleton Lucy, after the Beatles song 'Lucy in the Sky with Diamonds'. Lucy may have looked something like this.



An upright chimp

Like a chimpanzee, Lucy had a small brain, long, dangly arms, short legs and a cone-shaped thorax with a large belly. But the structure of her knee and pelvis show that she routinely walked upright on two legs, like us.

This form of locomotion, known as 'bipedalism', is the single most important difference between humans and apes, placing Lucy firmly

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within the human family.

"Bipedalism is the most distinctive, apparently earliest, defining characteristic of humans," says Johanson, now director of the Institute of Human Origins at Arizona State University.

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Admired from Afar

Johanson named Lucy's species *Australopithecus afarensis*, which means 'southern ape of Afar', after the Ethiopian region where Hadar is located.

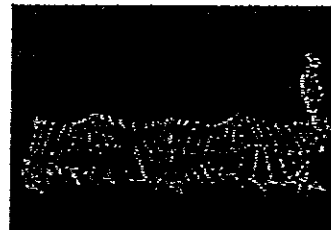
3.5 million years ago, *Australopithecus afarensis* foraged for fruit, nuts and seeds in a mixture of savannah and woodland. It may also have obtained animal protein from termites or birds' eggs.

In 1975, Michael Bush, one of Johanson's students, found the remains of more than 13 *afarensis* individuals buried together following a natural disaster - possibly a flash flood. The find yielded vital information about *afarensis*' social organisation.

"It is clearly a mixed sample of young and old, large and small - meaning several females and several males. It looks very much like the composition of *afarensis* groups was like what we see in chimpanzees," Johanson explains.

Standing tall

While Lucy undoubtedly walked upright, some scientists, such as Randall Susman of Stony Brook University in New York, doubt that she walked with straight legs like humans. Instead, they argue, she kept her hip and knees bent, like chimps do when they walk upright. Chimps usually walk on all fours, but occasionally walk upright for short periods of time.



Walking on two legs was one of the earliest defining characteristics of humans.

Professor Robin Crompton of Liverpool University has used computer modelling to reconstruct how Lucy walked based on the proportions of her skeleton. He assumed that Lucy could either have walked upright with a bent hip and knees like a chimp, or with straight legs like a human.

Forest origin

Crompton found it was mechanically effective for Lucy to walk like a human. But there was an even closer match between Lucy's proportions and a type of bipedalism shown by orangutans. This single finding could illuminate how our ancestors first started walking upright.

Orangutans live 20-40 metres above ground in the forests of Indonesia. They spend most of their time in an upright position, but suspend themselves from branches with their long arms.

However, orangutans sometimes walk on branches without aid, raising their arms for balance. Orangutans are not as closely related to humans as chimps. But this behaviour was recently observed in wild chimpanzees living in dense forest, suggesting it could be an ancestral trait common to all great apes.

Chimp cousins

Chimpanzees are our closest relatives. Genetic studies show humans and

chimpanzees shared a common ancestor that lived in the African rainforest 7-8 million years ago. The descendants of this common ancestor split into two lineages - one that led to chimps and another that led to us.

It is thought that the human lineage developed routine bipedalism as a strategy for living on the ground when climate change decimated the forest, leaving wide belts of open terrain with no trees.

Crompton believes the forest canopy bipedalism shown by orangutans provided the kick-start for routine bipedalism when our ancestors came down from the trees and began living on the ground.

Hit the ground walking

"This behaviour is a good place to start in terms of what pre-adapted the hominid body, particularly the hip joint and knee joint, for the adoption of habitual (routine) bipedalism," Crompton explains.

Once our ancestors were forced to adapt to living on the ground, some drew on this behaviour from their existing repertoire as a method of terrestrial locomotion.

The challenges of spending more time on the ground would have favoured those hominids whose anatomy and behaviour gave them a reproductive edge over their peers, however slight. Hominids that were good bipedal walkers were clearly at an advantage in this terrestrial environment, because millions of years later, we walk on two legs instead of four.



Questions - Answer in

Complete sentences

1. What is a hominid?
2. Why did scientists infer that Lucy walked on two legs?
3. What is Lucy's scientific name and what does it mean?
4. Compare the ideas of Randall Susman and Robin Crompton regarding Lucy's method of walking.
5. Explain how orangutans can sometimes walk upright.
6. Which apes are our closest relatives?
7. How long ago did we have a common ancestor with them?
8. Why was bipedalism helpful for Lucy and her kind?