

3-Million-Year-Old Bones Are Pint-Size 'Lucy'

Found in Ethiopia, the fossilized skeleton of a young girl belongs to a pre-human species that is considered a symbol of evolution.

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No one knows how her body found its way into the stream or how long her parents may have searched the shallows for the missing 3-year-old.

The child's fossilized skeleton — a tiny skull, a jaw with baby teeth still intact, a clutch of finger bones, the curled commas of ribs — are remains of a domestic calamity 3.3 million years ago when the human family was in its infancy, so long ago that the river in which she may have drowned has turned to stone.



Discovered in Ethiopia, her primitive skeleton is the oldest complete set of child remains on record, at least 3 million years older than any other comparable fossil of childhood, scientists announced Wednesday in the journal *Nature*.

The tiny female was the child of an ancestral pre-human species called *Australopithecus afarensis*, the same species as the iconic fossil specimen Lucy — long celebrated in the popular imagination as a symbol of human evolution. Their kind thrived in East Africa 3 million to 4 million years ago. Modern humankind, by comparison, arose 200,000 years ago.

The subject of intense scientific scrutiny, the child's bones are yielding insights into the origins of upright walking, brain development, the beginnings of speech and the unique pace of childhood development that sets humankind apart from all other primates, the researchers said.

Displaying the shoulders of a young gorilla and legs jointed more like a human girl, her bones merge the anatomy of humanity's earliest ancestors with more contemporary human characteristics, several experts said. She may have deftly swung from branches but also easily walked erect, even at age 3, the fossils suggest.

With a brutish jutting jaw, flat nose, and a weak, sloping forehead, she had a face only

a mother — or an anthropologist — could love.

"For us, the excitement is that this is a young child in the middle of a period when lots and lots of growth is happening, when the brain is developing, when the teeth are erupting, when the limb bones are growing," said paleoanatomist Fred Spoor at University College London who studied the find.

"Understanding growth and development is the key to evolution. That is the wider importance of the skeleton. You can study those processes at the beginning of human evolution — to see how you grow a new species," Spoor said.

Indeed, her bones contain "the biography of a species," said paleoanthropologist Zeresenay Alemseged at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, who led the international research team that made the find.

The child's bones were discovered in December 2000 in the remote Dikika desert region of northeastern Ethiopia.

Sweating in the hour of long shadows before sunset, Zeresenay and Tilahun Gebreselassie, a colleague from the Ethiopian Ministry of Culture, combed the steep rocks along an arid hillside. Two soldiers stood watch as they searched the ground, to guard against a possible raid by neighboring tribes.

Then, Tilahun spotted the discolored edge of an ancient cheekbone in the sand, Zeresenay recalled.

Her face was partially exposed, but her skull, shoulder blades, collarbones, ribs and backbone all were cemented in a hard ball of sandstone no bigger than a cantaloupe. Most of her ribs were positioned, as in life, along the curving spinal column.

Over the next three field seasons, researchers painstakingly picked through the hillside rocks to recover as many bone fragments as possible. Their work was supported by the French Center for Ethiopian Studies, the Institute of Human Origins at Arizona State University, the Leakey Foundation, the National Geographic Society and the Max Planck Society.

So far, they have found her entire skull, containing a natural sandstone impression of her growing brain, as well as most of her torso and limbs. One knee joint was covered by a kneecap no bigger than a dried pea, the researchers said.

"It is a very special discovery," said anthropologist Bernard Wood, an expert on human origins at George Washington University who was not involved in the research. "The degree of completeness is without parallel in a fossil this early."

Her brain was small, measuring not much larger than that of a chimpanzee of the same age. Her finger bones were curved and almost as long as a chimp's, suggesting to researchers that she may have used them to cling to her mother or, more tellingly, to branches.

In the same way, the shape of the toddler's inner ear, crucial to balance and equilibrium when moving, appeared more ape-like than human, the researchers reported.

All told, it took Zeresenay five years to partially clean and analyze the tiny skeleton, picking away the sandstone encrusting the bones a grain at a time with dental tools. Several more years of work will be needed to free all the bones from their sandstone tomb.

They determined the child's age and sex by looking at the teeth.

"The eruption pattern of the teeth is like a clock," Spoor said. "In this case, this child has all the baby teeth."

In addition, computerized CT X-ray scans of her upper and lower jaw revealed that almost all of her adult molars and incisors had formed inside the bones. "By studying how the roots were formed, we could accurately determine that it was 3 years old," he said.

The canine teeth revealed that the bones belonged to a female.

Among her remains, the researchers found the precursor of a bone crucial to human speech called the hyoid bone. Millions of years older than the only other known specimen, it suggests how her primitive voice box might have been shaped and the sounds it could produce.

In her case, the hyoid bone is more ape-like than human, resembling those found in African great apes, the researchers reported.

"Maybe she produced similar sounds," Zeresenay said.

Based on the geological evidence, the child dwelt in a world of lush forests and

grassland along a sluggish river delta where braided streams meandered into a lake. The bones were found in sediments that formed at the bottom of a small stream channel.

Did she stumble while foraging among the reeds and drown? Was she escaping a predator or caught by swift flood currents?

Of this, her bones reveal nothing. Death came suddenly. Burial in the sand was almost as quick. She was lost for eons and then found.