

Article

Who Was Ida?

One of the Oldest and Most Complete Primate Fossils

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Ida (pronounced *EE-duh*) is the most perfectly preserved **primate fossil** in the world. **Paleontologists**, scientists who study fossils, estimate that Ida died 47 million years ago. **Ninety-five percent complete**, she is the most complete primate fossil ever found. By comparison, the famous "**Lucy**" fossil, *Australopithecus afarensis*, is only 40 percent complete.

Ida was a small primate, about 9 months old when she died. From end to end she is only 58 centimeters (23 inches) long, about the size of a small house cat. Her body is 24 centimeters (9 inches) long. Ida's legs were longer than her arms, indicating she was a leaper. **X-ray** scans show she was a female. Ida's remains also show she had a broken right wrist. She didn't die of a broken wrist, but it almost certainly contributed to her early death.

Ida had large **eye sockets**, which suggests she was **nocturnal**. Nocturnal animals are active mainly at night. The shape of Ida's teeth suggests she was a **vegetarian**. However, scientists didn't have to guess what she ate. Her last meal—**fruit**—was still preserved in her **gut** millions of years after she ate it.

Ida had long fingers and toes, and **opposable thumbs**. Her hands show she had rounded fingertips with nails, not **claws**. Rounded fingertips with nails are classic primate features.

The scientific team that introduced Ida to the world was led by Dr. Jørn Hurum, a paleontologist at the Natural History Museum in Oslo, Norway. Hurum persuaded the museum to purchase Ida.

A private collector discovered Ida near Messel, Germany, in 1983. Until 2000, Ida's remains were split into two pieces. The main part ("Slab A") remained with the collector, while the other part ("Slab B") was sold to the Wyoming Dinosaur Center in Thermopolis, Wyoming, in the United States. Slab A and B were reunited in 2007. The identity of the person who first dug up Ida remains unknown.

One of the surprises Hurum and other paleontologists found when they X-rayed Ida was that she had many more teeth than the average primate. When the scientists looked closer, they discovered Ida was in the process of losing her **baby teeth**.

Unerupted molars—adult teeth that were pushing out her baby teeth—could still be seen in her **jaw**. From this, the paleontologists determined Ida was a **juvenile** primate—not a baby, but not fully adult, either. Developmentally, she was about the same age as Hurum's daughter, Ida, who was also losing her baby teeth. They decided to name the

fossil after her.

Darwinius masillae

Ida's scientific name is *Darwinius masillae*. The genus *Darwinius* was named in honor of Charles Darwin's 200th birthday. The species *masillae* was to commemorate the Messel Pit in Germany, where Ida was found.

The Messel Pit is an abandoned quarry about 35 kilometers (22 miles) southeast of Frankfurt, Germany, near the village of Messel. The pit was formed millions of years ago when hot magma bubbling from under the earth came too close to the underground water table. When the magma hit the water table, it instantly turned to steam. Hot air rises, but this air had nowhere to go. The pressure of the steam caused a massive explosion as the hot air tore into the earth. The explosion created a type of volcanic lake known as a maar.

The explosion that formed Messel Lake happened about 50 million years ago, during the early Middle Eocene epoch. Because the maar had no rivers running into or out of it, the water at the bottom of the lake received very little oxygen. Anything that fell into the lake was remarkably well-preserved. They didn't go through the same decomposition process that other living things do when they die.

Another characteristic of maars is that they sometimes spit out toxic gas. Maars have volcanoes under them, and from time to time they emit carbon dioxide gas. The pure CO₂ travels up from the lake and can kill any living creature that breathes in the gas.

Scientists speculate this is what killed Ida. Her broken wrist meant she couldn't leap and cling to high tree branches. Lower to the ground, she encountered the toxic gas in Messel Lake, lost consciousness, and drowned.

In 2001, a hole was drilled into the center of the Messel Pit. Scientists extracted volcanic rocks that formed the ancient lake. Dating the rocks in the Messel Pit showed that Ida was about 47 million years old.

The Nose Knows

Ida lived her short life during the Eocene. The Eocene lasted from 55 million to about 34 million years ago. The Eocene is an important period in human evolution, because it was during this time that the first primates were evolving. About 40 million years ago, there were two distinct primate groups: prosimians and anthropoids.

One way taxonomists separate prosimians and anthropoids is by their noses. Prosimians, or strepsirrhini, have dog-like, wet noses. Extant, or living, representatives of strepsirrhini include lemurs, lorises, and bush babies. Anthropoids, or haplorhini, have dry noses. Extant representatives of haplorhini include monkeys and apes. Humans are also dry-nosed primates. At some point during the Eocene, primates evolved into these two different branches.

So was Ida a wet-nosed or a dry-nosed primate? She contains qualities of both, making her a truly remarkable specimen.

The team from the Natural History Museum in Oslo believes her physical size and diet were similar to the eastern woolly lemur, a wet-nosed primate native to Madagascar. However, Ida doesn't possess two key lemur traits: a toothcomb or a grooming claw. A toothcomb is a set of fused, forward-angled teeth in the lower jaw that lemurs use to groom their fur. A grooming claw is a long claw on the second toe that lemurs use to groom fur they can't reach with their toothcomb. Ida also has a tarsus bone in her ankle that is shaped like a dry-nosed primate ancestor's.

The Oslo team believes Ida comes from a time when primates were still evolving into these two distinct groups. Because Ida has characteristics of both, they consider her a transitional species—a link between prosimian and

arthropoid primates.

Other scientists who have read the published paper disagree with its conclusions. They say Ida is an [ancestor](#) of lemurs and lorises, not a ["missing link."](#)

Girly Fossil

Hurum [frequently](#) speaks about Ida and other fossils to school groups. He says Ida attracts more questions from girls than boys. Girls are interested in how Ida lived—what she looked like, what she ate, how she moved, how she [cope](#)d with her broken wrist.

"Most [dinosaur](#) outreach focuses on the big and dangerous ones, big teeth and fights," Hurum said. "This is in my opinion, after giving lectures to several thousand school children over the years, mostly enjoyed by boys. They ask questions and contribute more to the [dialogue](#)."

"With Ida it is opposite. I get more questions from girls—the fossil is small and cute and the story is dramatic, but not bloody."

VOCABULARY

Term	Part of Speech	Definition
abandon	<i>verb</i>	to desert or leave entirely.
ancestor	<i>noun</i>	organism from whom one is descended.
ancient	<i>adjective</i>	very old.
anthropoid	<i>noun, adjective</i>	grouping of "higher primates," including monkeys, apes, and human beings.
ape	<i>noun</i>	large, intelligent primate with no tail.
Australopithecus afarensis	<i>noun</i>	extinct species of primate (hominid) that lived about 3-4 million years ago.
baby teeth	<i>plural noun</i>	first set of teeth in mammals, which eventually fall out as permanent teeth replace them. Also called primary teeth and deciduous teeth.
bush baby	<i>noun</i>	small mammal (primate) native to Central African forests.
carbon dioxide	<i>noun</i>	greenhouse gas produced by animals during respiration and used by plants during photosynthesis. Carbon dioxide is also the byproduct of burning fossil fuels.
Charles Darwin	<i>noun</i>	(1809-1882) British naturalist.
claw	<i>noun</i>	sharp, curved nail on the foot of some animals, used for protection, predation, climbing, or grooming.
commemorate	<i>verb</i>	to honor an event on a specific date.
conscious	<i>adjective</i>	aware of.
cope	<i>verb</i>	to handle or deal with problems.
Darwinius masillae	<i>noun</i>	extinct species of primate which lived in the Eocene, about 47 million years ago.
decompose	<i>verb</i>	to decay or break down.

dialogue	<i>noun</i>	conversation between two people or organizations.
diet	<i>noun</i>	process of choosing food and drink in order to lose weight.
dinosaur	<i>noun</i>	very large, extinct reptile chiefly from the Mesozoic Era, 251 million to 65 million years ago.
earth	<i>noun</i>	soil or dirt.
eastern woolly lemur	<i>noun</i>	primate native to eastern Madagascar. Also called eastern Avahi laniger or Gmelin's woolly lemur.
emit	<i>verb</i>	to give off or send out.
encounter	<i>verb</i>	to meet, especially unexpectedly.
Eocene	<i>adjective, noun</i>	(55-34 million years ago) epoch of the Tertiary Period in the Cenozoic Era.
evolution	<i>noun</i>	process of how present types of organisms developed from earlier forms of life.
explosion	<i>noun</i>	violent outburst; rejection, usually of gases or fuel
extant	<i>adjective</i>	living or in existence; prominent or standing out.
extract	<i>verb</i>	to pull out.
eye socket	<i>noun</i>	hole in the skull where the eyeball and its associated tissues are secured. Also called the orbit and eye socket orbital cavity.
fossil	<i>noun</i>	remnant, impression, or trace of an ancient organism.
frequent	<i>adjective</i>	often.
fruit	<i>noun</i>	edible part of a plant that grows from a flower.
fuse	<i>verb</i>	to combine or meld together.
gas	<i>noun</i>	state of matter with no fixed shape that will fill any container uniformly. Gas molecules are in constant, random motion.
groom	<i>verb</i>	to tend or carefully clean, brush and make tidy.
grooming claw	<i>noun</i>	specialized claw on the toe of some primates used for grooming their fur. Also called a toilet claw.
gut	<i>noun</i>	part of the abdominal cavity including the digestive tract, stomach, and intestines.
Haplorhini	<i>noun</i>	suborder of primates, ("dry-nosed primates") including monkeys, apes, and human beings.
Ida	<i>noun</i>	nickname of the nearly complete skeleton of the primate species <i>Darwinius masillae</i> , approximately 47 million years old, discovered in Germany in 1983.
jaw	<i>noun</i>	set of bones or exoskeleton that form the framework of the mouth.
juvenile	<i>noun</i>	animal that is no longer a baby but has not reached sexual maturity.
lake	<i>noun</i>	body of water surrounded by land.
lemur	<i>noun</i>	type of small mammal (primate).
loris	<i>noun</i>	small primate native to Southeast Asia.
Lucy	<i>noun</i>	nickname of an incomplete skeleton of the species <i>Australopithecus afarensis</i> , approximately 3.2 million years old, discovered in Ethiopia in 1974.

maar	<i>noun</i>	depression formed as magma reacts with groundwater.
magma	<i>noun</i>	molten, or partially melted, rock beneath the Earth's surface.
massive	<i>adjective</i>	very large or heavy.
missing link	<i>noun</i>	species that has characteristics of two different clades, or species and all its descendents. Usually refers to species sharing characteristics of apes and humans.
molar	<i>noun</i>	large, flat tooth used for chewing and grinding.
monkey	<i>noun</i>	mammal considered to be highly intelligent, with four limbs and, usually, a tail.
nocturnal	<i>adjective</i>	active at night.
opposable thumb	<i>noun</i>	thumb that can be placed opposite the fingers of the same hand.
oxygen	<i>noun</i>	chemical element with the symbol O, whose gas form is 21% of the Earth's atmosphere.
paleontologist	<i>noun</i>	person who studies fossils and life from early geologic periods.
possess	<i>verb</i>	to have or own.
preserve	<i>verb</i>	to maintain and keep safe from damage.
primate	<i>noun</i>	type of mammal, including humans, apes, and monkeys.
prosimian	<i>adjective, noun</i>	grouping of primates, including lemurs, lorises, and tarsiers.
quarry	<i>noun</i>	site where stone is mined.
remarkable	<i>adjective</i>	unusual and dramatic.
river	<i>noun</i>	large stream of flowing fresh water.
species	<i>noun</i>	group of similar organisms that can reproduce with each other.
specimen	<i>noun</i>	individual organism that is a typical example of its classification.
speculate	<i>verb</i>	to consider or guess.
steam	<i>noun</i>	water vapor.
Strepsirrhini	<i>plural noun</i>	one of the two suborders of primates ("wet-nosed primates"), including lemurs and lorises.
tarsus	<i>noun</i>	group of bones, including the ankle, between the leg and the foot.
taxonomist	<i>noun</i>	scientist who studies the description, identification, naming, and classification of organisms.
toothcomb	<i>noun</i>	long, flat, fused, forward-facing teeth on the lower jaw that some primates, such as lemurs and lorises, use for grooming their fur. Also called a dentalcomb.
toxic	<i>adjective</i>	poisonous.
trait	<i>noun</i>	characteristic or aspect.
transitional species	<i>noun</i>	species that has characteristics of two different clades, or species and all its descendents. Sometimes called a transitional fossil or missing link.
unerupted	<i>adjective</i>	tooth that remains below the surface of the gum. Also called impacted or embedded teeth.

vegetarian	<i>noun</i>	person who does not eat meat.
village	<i>noun</i>	small human settlement usually found in a rural setting.
volcanic	<i>adjective</i>	having to do with volcanoes.
volcano	<i>noun</i>	an opening in the Earth's crust, through which lava, ash, and gases erupt, and also the cone built by eruptions.
water table	<i>noun</i>	underground area where the Earth's surface is saturated with water. Also called water level.
X-ray	<i>noun</i>	radiation in the electromagnetic spectrum with a very short wavelength and very high energy.

For Further Exploration

Articles & Profiles

- National Geographic News: "Missing Link" Found: New Fossil Links Humans, Lemurs?
- National Geographic Explorers: Dr. Jørn Hurum

Worksheets & Handouts

- Journal of Human Evolution: Darwinius masillae is a Haplorhine—Reply to Williams et al.

Websites

- The Link: Uncovering Our Earliest Ancestor



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