

Primate Evolution

section 2 Hominoids to Hominins

● Before You Read

Humans are bipedal—they can walk upright on two legs. On the lines below, list possible advantages of walking upright, instead of walking on four limbs. Then read the section to learn why bipedalism might have evolved.

MAIN Idea

Hominins likely evolved in response to climate changes of the Miocene epoch.

What You'll Learn

- the evolutionary path of hominoids from *Proconsul* to *Homo*
- characteristics of various australopithecine species

● Read to Learn

Hominoids

Hominoids (HAH mih noydz) include all nonmonkey anthropoids—gibbons, orangutans, chimpanzees, gorillas, and humans. By comparing DNA of living hominoid species, researchers conclude that gibbons likely branched from anthropoids first. Next to the branch were orangutans, gorillas, chimpanzees and bonobos, and finally humans. Chimpanzees and bonobos are the closest living relatives to humans. The figure below shows the time line of primate evolution.

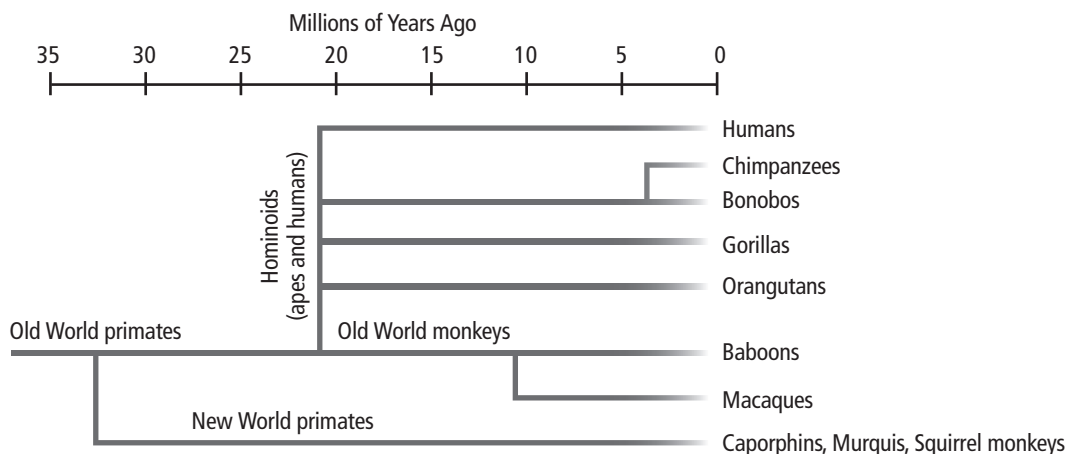
Mark the Text

Highlight Main Ideas

As you read the section, highlight the main ideas in each paragraph.

Picture This

- 1. Identify** Circle the branch containing the human species.



Reading Check

2. Identify a body characteristic of hominins that differs from other hominoids.

Picture This

3. Highlight each important discovery as you read about it in the section.

What characteristics do hominoids share?

Hominoids are the largest primates. They have the largest brains for their body sizes. Typical traits include a broad pelvis, long fingers, no tail, and flexible arm and shoulder joints. They have mostly upright postures. All hominoids, except for hominins, have longer arms than legs. Their teeth are less specialized than other primates.

Earth’s climate changed during the Miocene (24 to 5 mya). It became warmer and drier. Tropical rain forests shrank. Dry forests and savannas appeared. Many new animals evolved, including hominoids, that were able to take advantage of the new environment. Hominoids migrated from Africa to Europe and Asia.

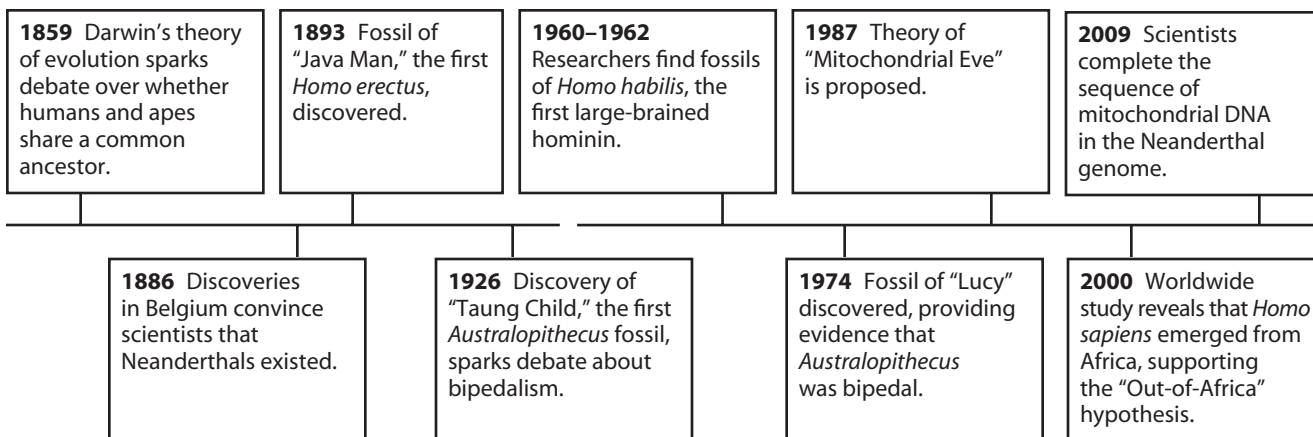
Why is Proconsul important?

Some of the oldest hominoid fossils are from the genus *Proconsul*. *Proconsul* species had small brains. Although they lived mostly in trees, some might have been able to walk upright. Some scientists think that *Proconsul* is a human ancestor. Others suggest that humans rose from a European hominoid that returned to Africa at the end of the Miocene.

Hominins

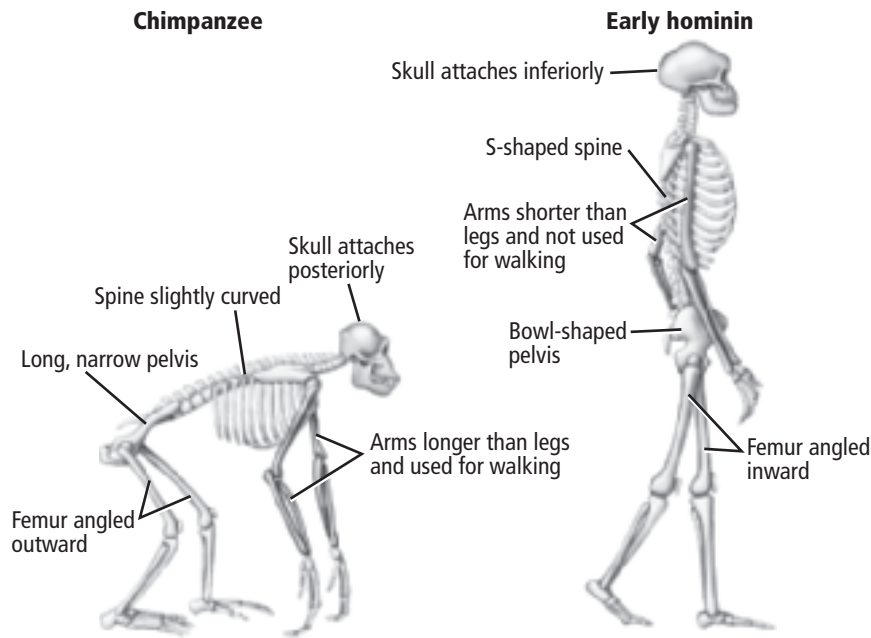
The hominins include humans and all their extinct relatives. Hominins split off from other African apes sometime between 8 and 5 mya. The figure below highlights some important hominin discoveries.

The brains of hominins are larger than those of other hominoids and have more capacity for high-level thought. The hominin face is thinner and flatter. The teeth are smaller. Longer thumbs and more flexible wrists increase manual dexterity.



What structures support upright walking?

Hominins are **bipedal**—they can walk upright on two legs. The figure below shows how the structures of a biped differ from those of a quadruped, an animal that walks on all four limbs. Note how the shapes of the spine, arms, pelvis, and legs are adapted for upright walking. Also note that in quadrupeds, the spine extends from the back of the skull. In bipeds, the spine extends from the base of the skull.



What are some disadvantages of bipedalism?

Walking upright has disadvantages. Bipedal individuals are easier for predators to see. They might not run as fast as their predators. Also, walking upright puts more strain on the hips and back. Because walking upright opposes gravity, it requires more energy than walking on all four limbs. ✓

Why did hominins become bipedal?

At the time hominins evolved, Africa was changing. Many scientists suggest that bipedalism was an adaptation to the new savanna environment. Food sources were sparse and far apart. By walking upright, individuals were able to travel longer distances and to spot food more easily.

Another theory suggests that walking on two legs freed hands for purposes such as carrying objects. Still another theory suggests that an upright posture enabled hominins to reach fruit on low tree branches.

Picture This

4. Color the arms of the chimpanzee and the early hominin.

✓ Reading Check

5. Summarize three possible disadvantages of bipedalism.



Think it Over

6. Draw Conclusions

Based on what you know about bipedal adaptations, where do you think the opening in the skull was in *A. africanus*?

Reading Check

7. Explain

what the paranthropoids were.

What were the first bipedal hominins?

Bipedalism was one of the first hominin traits to evolve. Scientists look for evidence of bipedalism to identify hominin fossils. The **australopithecines** (aw stray loh PIH thuh sees) were the first truly bipedal hominins. They lived in east-central and southern Africa between 4.2 and 1 mya. They were small, only about 1.5 m tall, with apelike brains and jaws. Their teeth and limb joints were humanlike.

What debate did the Taung child spark?


In 1926, anthropologist Raymond Dart discovered the first australopithecine fossil, the “Taung child,” in Africa. He called the species *Australopithecus africanus*. The location of the opening in the skull where the spine attached convinced Dart that *A. africanus* was bipedal. Some scientists disagreed. They believed that larger brains evolved before bipedalism.

How did Lucy help to resolve the debate?

The discovery of “Lucy” in Kenya in 1974 by Donald Johanson helped to resolve the debate. Lucy is one of the most complete australopithecine fossils ever found. She was about the size of a chimpanzee. She had a small brain, long arms, and curved finger bones. But her hip and knee joints showed clearly that Lucy walked upright. A few years later, Mary Leakey found fossilized footprints that supported the theory that australopithecines were bipedal.

How can hominin evolution be described?

Hominin fossils show a patchwork of human and apelike traits. Different body parts or behaviors evolved at different rates. This is called mosaic evolution.

Scientists have discovered many more early hominin fossils in the last 30 years. They disagree about how to classify them. For example, *A. bosei* and *A. robustus* were classified as australopithecines. Today, many scientists put these primates in a separate genus called *Paranthropus*. Paranthropoids lived alongside human ancestors but were not human ancestors themselves. 

Many species of hominins lived successfully for years, often overlapping with earlier species. Then they became extinct. No one knows why. By 1 mya, all australopithecines had disappeared from the fossil record. Later hominin fossils were only of humans and their close relatives.