

Evidence of Evolution

- 9.1 [Mechanisms of Evolution](#)
- 9.2 [How New Species Form](#)
- 9.3 [Natural Selection in Action](#)
- 9.4 [Fossils](#)
- 9.5 [Body Structures and Genetics](#)
- 9.6 [Biogeography](#)
- 9.7 **The Evolution of Humans**



9.7 The Evolution of Humans

Humans are *primates*, a group of mammals that also includes the monkeys and apes. This does not mean we are descended from any modern species of monkey or ape, just that we share a common ancestor with these species more recently than we do with a dog, or a lizard, or a plant. Humans are also *hominids*, the group within the primates that includes modern *Homo sapiens* (our species) as well as some of our extinct relatives. Although humans are the only hominids in existence today, fossil hominids provide clues as to how humans evolved. A timeline of human evolution is shown in Figure 9.17.

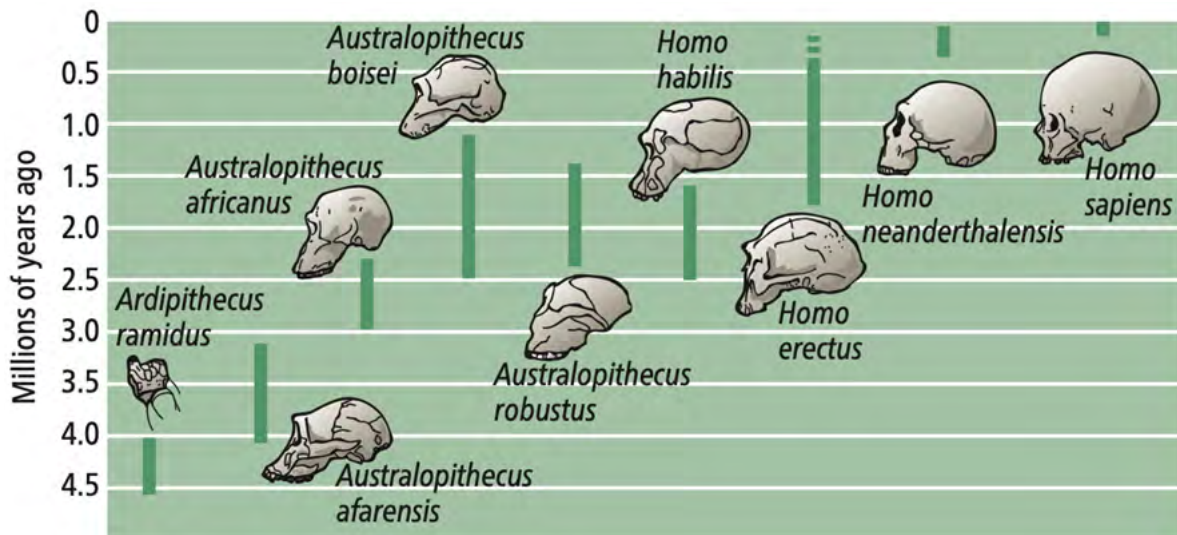


FIGURE 9.17

This timeline shows when certain hominid species existed on Earth. The skulls (or skull fragments) are all drawn to the same scale to show relative brain sizes.

Some of the earliest hominids known belong to the group *Australopithecus*. Fossil *Australopithecus* have been found at multiple sites in Africa, where hominids originated. “Lucy,” the famous *Australopithecus afarensis* fossil shown in Figure 9.18, dates from about 3.2 million years ago. When she was alive, Lucy stood 3 feet 8 inches tall and had a brain about the size of a chimpanzee’s. However, the bones of Lucy’s pelvis make it clear that she walked upright on two legs. In fact, older *Australopithecus* fossils show that an upright posture dates to at least 4 million years ago and therefore evolved long before increased brain size and intelligence.





FIGURE 9.18

“Lucy,” a fossil *Australopithecus afarensis*, stood upright and walked on two feet.

Homo habilis is the earliest known species in the group *Homo*, which includes the species most closely related to modern humans. Some *Homo habilis* fossils are 2.2 million years old. *Homo habilis* had a larger brain than *Australopithecus*. *Homo habilis* also made stone tools—in fact, its scientific name means “handy man.” Male *Homo habilis* were much larger than females. This is interesting because in other primates, such as gorillas and baboons, a big size difference between males and females is a sign that males fight each other for female mates.

Homo erectus lived from about 2 million years ago to about 400,000 years ago. *Homo erectus* had an even larger brain than *Homo habilis*. In fact, the brain of *Homo erectus* was only a little smaller than that of modern humans.

Homo erectus was a skilled toolmaker as well as the first hominid species to migrate out of Africa and spread into what is now Europe and Asia. Like *Homo habilis*, older *Homo erectus* fossils show that males were much larger than females. However, later fossils of the same species show a male–female size difference closer to that present in modern humans, suggesting the development of a more humanlike social system.

The Neanderthals—*Homo neanderthalensis*—are closely related to modern humans (Figure 9.19). They lived from about 400,000 years ago to about 30,000 years ago.

FIGURE 9.19

Neanderthals coexisted with modern humans and interbred with them. These reconstructions appear at the Neanderthal Museum in Mettmann, Germany.

Neanderthals had very thick arms and legs, and their brains were as large as those of modern humans. Archaeological finds show that Neanderthals were effective hunters, had complex burial rituals, and made use of medicinal plants. One question that remains unanswered is whether the Neanderthals had language. For thousands of years, modern humans coexisted with Neanderthals. However, Neanderthal populations disappeared as modern humans spread. Scientists are not sure why, although it seems possible that modern humans outcompeted the Neanderthals and drove them to extinction. The development of modern genetic techniques has allowed scientists to collect information about the Neanderthals from a new source—DNA (Figure 9.20). Using fossil remains, scientists were able to sequence the Neanderthal genome.





FIGURE 9.20

A scientist drills a sample of bone from a Neanderthal fossil in order to extract and study its DNA.

This resulted in a huge surprise—most modern humans have some Neanderthal DNA! Neanderthal DNA accounts for about 1 to 4 percent of the genome of most humans. The genetic data indicate that Neanderthals and modern humans interbred at some point in the past.

The earliest fossils of modern humans, *Homo sapiens*, were found in Ethiopia and are 195,000 years old.

Although anatomically modern humans are quite old, the cultural traits we associate with humans—things like art, music, and religion—are more recent, appearing only about 50,000 years ago. The reason for this gap between modern anatomy and modern behavior is the subject of continued debate.

READING CHECK

- 1. Have multiple species of hominids ever coexisted on Earth? Do any hominids other than humans survive to this day?**
- 2. What is the significance of the transition from a large male–female size difference in early *Homo erectus* fossils to a size difference closer to that of modern humans in later fossils of the same species?**
- 3. What is the result of trillions and trillions of living things passing genetic traits to their offspring, here and there making an adaptive change, and surviving to today?**

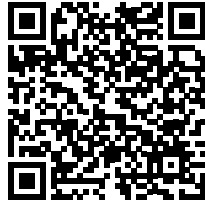
CHECK YOUR ANSWERS

1. The timeline of hominid evolution shows that multiple species of hominids coexisted during much of hominid history. Today, however, humans are the only species of hominids in existence. The others have all died out.
2. A large size difference between males and females is a sign that males fought each other for female mates. This may have been true in early *Homo erectus*. More equal body sizes in later *Homo erectus* suggests that males and females may have formed longer-term bonds, perhaps as they raised offspring together.
3. We and Earth's other living things are the result of this long and astounding journey!



You can read more about human evolution at the Smithsonian Institution's:

<https://humanorigins.si.edu/education/introduction-human-evolution>



But wait! If humans and Neanderthals once interbred, why do we consider them different species? Here's an expert's take on this interesting question:

<https://www.nhm.ac.uk/discover/are-neanderthals-same-species-as-us.html>

