



## Where Did the Giant Mammals Go?

After the dinosaurs, giant mammals ruled Earth for millions of years—then suddenly, most of them disappeared. What happened?

When the Chicxulub asteroid struck, and plunged Earth into darkness and cold, large dinosaurs became extinct.

Early mammals—small, warm-blooded and covered in fur—were able to survive. And, over a few million years, they grew in size to occupy the environmental niches the dinosaurs had vacated.

There were bears the size of rhinos, and rhinos the size of elephants. There were 400-pound beavers and 10-foot-tall ground sloths. They existed from 50 million years ago until around 50,000 years ago. Then, rather suddenly, most went extinct.

There are two hypotheses. As Earth's climate warmed, some areas became too wet and boggy to support large animals.

Other areas dried out and lost their vegetation. Without plants to eat, herbivores starved. Without herbivores to eat, carnivores starved.

Who didn't starve? Us. Humans.

The other related hypothesis is that humans, as we migrated around the globe, found large mammals to be an excellent food source.

Hunting pressure on these slow-reproducing animals, especially in Australia and North America, may have caused their populations to crash.

In Africa, though, where humans originated, we'd reached more of an equilibrium with megafauna, and 80% of large mammals still survive.

The Rancho La Brea Tar Pool as depicted by Charles R. Knight in 1921, including a saber-toothed cat (*Smilodon fatalis*, left), three ground sloths (*Paramylodon harlani*, right), Columbian mammoths (*Mammuthus columbi*, background) and *Teratornis* birds of prey in the tree.

Credit: Charles Robert Knight, public domain, via Wikimedia Commons



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# Background: Where Did All the Giant Mammals Go?

**Synopsis:** After the demise of the dinosaurs, mammals grew larger to occupy the former niches of dinosaurs. Then as the most recent continental glaciers retreated, 178 species of giant mammals disappeared globally. What happened to our bear-sized 400 lb (180 kg) giant beavers and 10 ft (3 m) tall giant sloths?

- Megafauna is a term typically used for large animals weighing more than 97 lb (44 kg).
  - Today's elephants, giraffes, hippopotamuses, rhinoceroses, cattle, buffalo, bison, antelopes, lions, tigers and bears are megafauna. Maybe even your dog.
- Before the Chicxulub impact 66 million years ago (ED-096 Real-World Apocalypse), the first mammals lived alongside the dinosaurs, but most were about the size of a mouse, with some as large as a small dog 30 lb (14 kg).
  - Their small sizes enabled them to survive and maintain a low profile in an era dominated by dinosaurs. These nocturnal hunters typically lived in the crowns of trees or underground, and ate plants, insects, and juvenile animals.
  - In the wake of the impact, their smaller sizes meant they could survive on less food than the gargantuan dinosaurs.
- Additionally, they had fur and were warm-blooded, so could stay warm as global temperatures plunged in the darkness.
- After about 10–15 million, mammals grew to giant sizes, slowly radiating into ecological niches left behind by the dinosaurs.
  - Beginning more than 50 million years ago, in the Eocene epoch, herbivorous megafauna that were the ancestors of horses, whales and elephants evolved, as well as animals that looked like a cross between rhinoceroses and hippopotamuses. A variety of carnivorous mammals preyed on these slow moving grazers.
  - From 5 million years ago, during the Pliocene and Pleistocene epochs, an amazing variety of giant herbivores thrived, including mammoths and mastodons, *Coelodonta* (woolly rhino), aurochs (giant cattle), *Megaloceros* (giant deer), *Castoroides* (bear-sized beavers), *Paramylodon* (giant ground sloths) and *Ursus spelaeus* (the giant cave bear), as well as the carnivorous *Smilodon* (giant saber-toothed cat) and other predators, including humans.



A 125 million-year-old Chinese fossil of this badger-sized Cretaceous mammal, *Repenomamus*, was found with a *Psittacosaurus* dinosaur hatchling in its stomach, leading to this artist's depiction.

Credit: Nobu Tamura (<http://spinops.blogspot.com>), CC BY 3.0, via Wikimedia Commons



The giant Pleistocene beaver, *Castoroides ohioensis* was the largest rodent that ever lived, reaching 6 feet long and over 400 pounds (the size of a modern black bear!).

Credit: Ryan Somma from Occoquan, USA, CC BY 2.0, via Wikimedia Commons

## References: Where Did All the Giant Mammals Go?

Giant Mammals of the Cenozoic Era | ThoughtCo  
Did Humans Cause the Quaternary Megafauna Extinction? | Our World in Data  
Why Did the Ice Age Titans Go Extinct? | La Brea Tar Pits  
Are Humans to Blame for the Disappearance of Fantastic Beasts? | Smithsonian  
Ancient Fires Drove Large Mammals Extinct, Study Suggests | New York Times

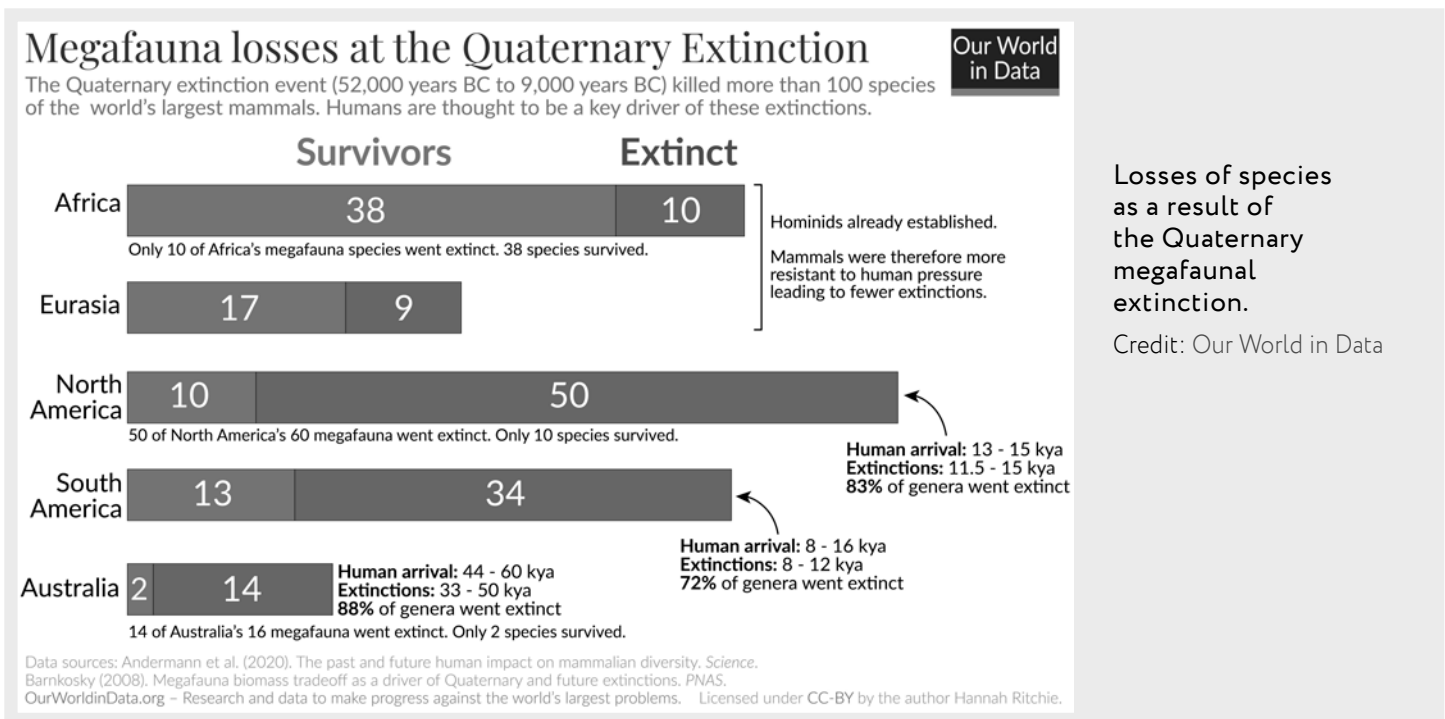
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- But during the late Pleistocene, about 54,000 years ago, things began to change for Earth's megafaunal mammals. What ensued is known as the Quaternary megafaunal extinction (QME).
  - From about 54,000–11,000 years ago 178 species of Earth's largest mammals became extinct in the largest extinction event since the Chicxulub impact. Smaller mammals did not experience the same decline.
  - North America was hard hit in a remarkably fast extinction event that wiped out 83% of large mammals and lasted just 3,500 years. Other continents saw extinctions spread over longer time frames.
- While there is not a definitive answer, there are two themes for the hypotheses addressing what caused these extinctions.
- The first hypothesis involves abrupt climate change at the end of Pleistocene glacial–interglacial periods, lasting about 100,000 years each.
  - As Pleistocene glacial–interglacial events waned, environmental disruption occurred in many ecosystems as distribution of vegetation changed and climatic variation became seasonal.
  - Some areas became too boggy and wet to support large animals, while other areas dried out and became fire prone, as has been confirmed by recent research at the famous La Brea Tar Pits in Los Angeles where more than 3.5 million fossil specimens have been recovered.
  - Lacking the vegetation they needed, herbivores starved, and lacking herbivores, carnivores starved. But smaller mammals somehow survived, possibly by eating seeds and fungus.
- The other hypothesis, known as the Overkill Hypothesis, involves human encroachment resulting in selective overpredation of large species.



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- Ancient Fires Drove Large Mammals Extinct, Study Suggests | New York Times

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- Researchers have demonstrated that human migration to each continent preceded most megafaunal extinction events. The events did not happen simultaneously around the globe.
- Large animals were selectively impacted. Since larger species tend to be slower to reproduce, population crashes are harder to overcome, but this is the only Cenozoic extinction event that singled out megafauna.
- Since humans evolved in Africa and Eurasia, they had interacted with mammals over a longer time period, effecting an equilibrium of sorts. These two continents experienced the earliest extinctions but fared the best in terms of loss of giant species with 21% and 35% respectively.
- Sometime between 65,000 and 44,000 years ago, humans reached Australia, and by 40,000 years ago 82% of the continent's megafauna had been wiped out. Today 88% are extinct.
- North and South America lost 83% and 72% respectively around 4,000 years after humans arrived.
- Most researchers point to a combination of the two causes that varies geographically depending on both human migration and regional climate impacts, such as human caused fires in dry vegetation.



Early excavation for megafauna specimens at La Brea Tar Pits, around 1913 to 1915. Note the oil derricks of the Beverly Hills oil field in the background.

Credit: Scotwriter21, CC BY-SA 4.0, via Wikimedia Commons

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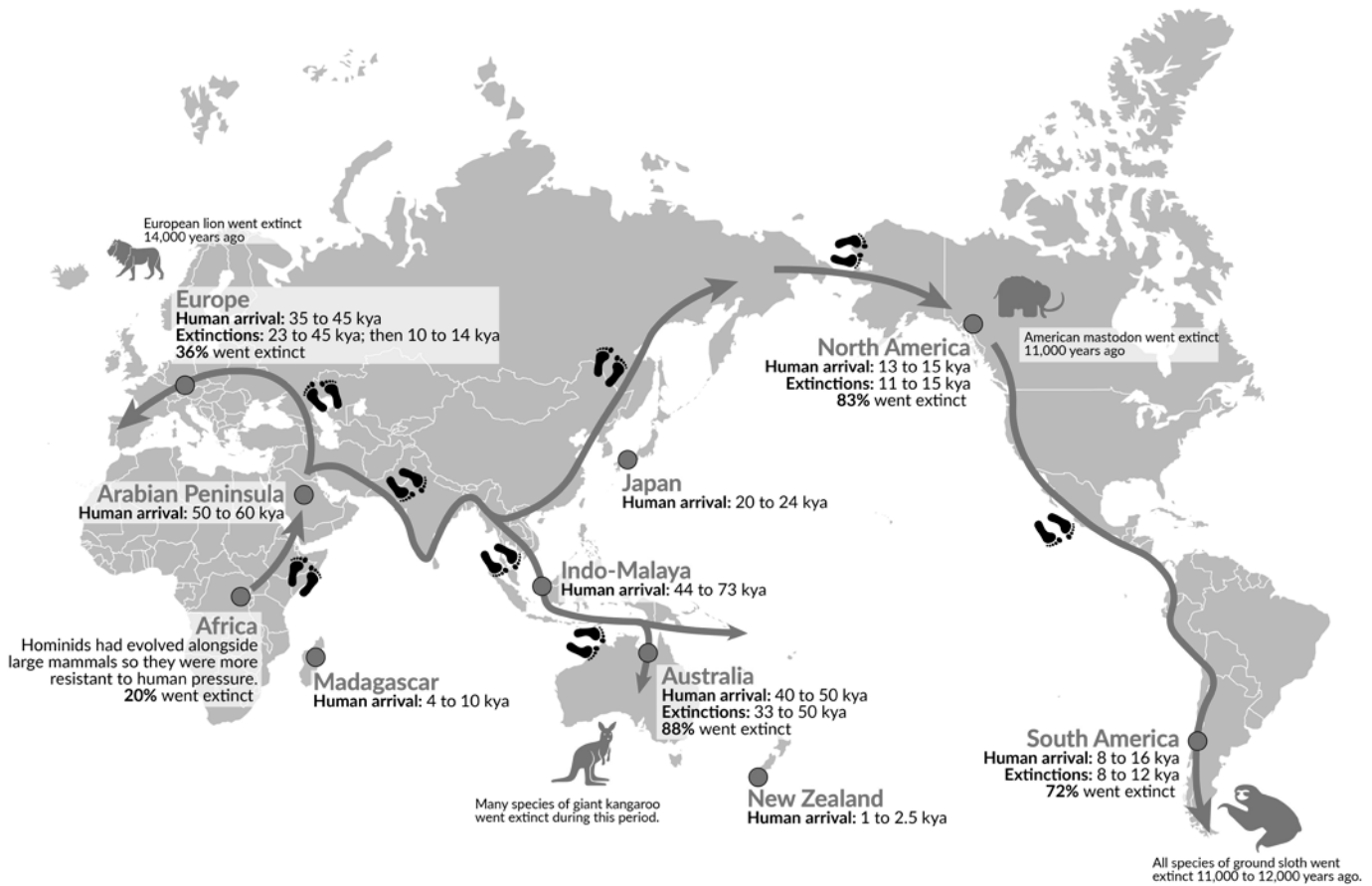
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## Human migration and the extinction of large mammals

Our World  
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The Quaternary Megafauna extinction killed off more than 178 of the world's largest mammal species from 52,000 to 9,000 BC. These extinctions closely mapped human migrations across the world's continents.



Data Source: Andermann et al. (2020). The past and future human impact on mammalian diversity. *Science*. Images sourced from Noun Project.

OurWorldinData.org - Research and data to make progress against the world's largest problems.

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Correlation of human migration with Late Pleistocene and Holocene megafaunal extinctions.

Credit: Our World in Data

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