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# EXTINCTION LEVEL EVENTS



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# EXTINCTION LEVEL EVENTS

By Cynthia Stokes Brown, adapted by Newsela

Life on Earth has seen several periods when a large portion of its species died off. Yet, they've always led to a recovery and the rise of a newly shaped tree of life.



Volcanic activity is thought to have contributed to many of Earth's extinction events

## Five major extinction events

An extinction event is a time in the Earth's history when many living organisms die off. Species are always going extinct, but it happens much more quickly during an extinction event.

Geologists and paleontologists study extinction events. They investigate sedimentary rocks and marine fossils to find important clues about the history of our planet.

It wasn't until the 1980s that scientists agreed on the five major extinction events.

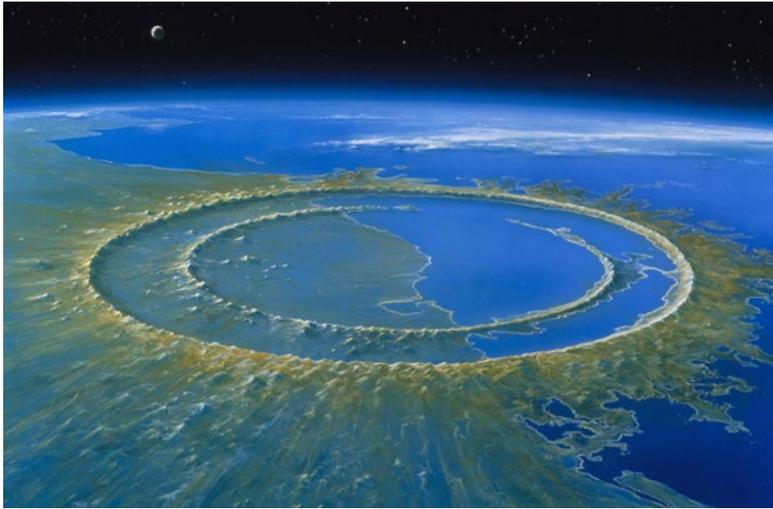
## The "crater of doom"

One day about 65.5 million years ago, dinosaurs were grazing and hunting around the world. An object the size of Mount Everest came flying through space.

The odds were against it, but the object hit Earth. It may have been a comet, made of dirty ice, or an asteroid, made of rock. The object landed just off the coast of what is now the Yucatán Peninsula in Mexico. It was traveling about 150 times as fast as a jet.

The impact made a hole the size of Belgium. It kicked up debris that rose high into the atmosphere and circled around the earth. The collision created so much heat that huge forests burned. This sent more pollution into the atmosphere.

The Sun's rays were blocked by smoke and debris. Photosynthesis slowed or stopped. The temperature cooled and the amount of rainfall decreased.



An illustration of the K-T impact crater

Plants and animals died. Almost all the dinosaurs died. The only ones to survive were some avian dinosaurs that were evolving into birds. About 75 percent of all species disappeared. Crocodiles, turtles, and small, rodent-like mammals survived. The small mammals are our ancestors.

Geologists call this extinction event the “K-T event.” It marked the end of the Cretaceous period and the beginning of the Tertiary period. (Cretaceous is spelled with a “K” in German.)

The story of the K-T event is well understood thanks to years of patient detective work. It started when young geologist Walter Alvarez made a discovery in the mountains of Italy. He found a thin layer of clay between the layers of Cretaceous and Tertiary limestone. The Cretaceous layer contained many more marine fossils than the Tertiary layer.

Alvarez’s team found iridium in the layer of clay. Iridium is an extremely rare element on Earth. It’s more common in meteorites. The iridium suggested an impact by an asteroid or comet around the date of the extinction. They reported in 1980 that an asteroid or comet had hit and caused massive extinction by changing the air and water.

Most geologists accepted this hypothesis based on strong evidence. Others were unsure. If a massive asteroid or comet had hit, where was the crater? No known depression on land seemed large enough for such a massive object. It seemed the crater must be under water.

Large objects that hit water create huge tsunami waves. These waves leave unique signs in the rock record. Rocks on the shores of Texas showed these signs. In 1950, across the Gulf of Mexico, geologists from an oil company mapped a 120-mile underwater crater off the coast of the Yucatán Peninsula.

It wasn’t until 1991 that the K-T researchers got in touch with the oil-company geologists. The K-T researchers realized that the “crater of doom” had been found. They named it Chixculub (a Mayan word pronounced cheek-shoe-lube), after the small coastal town nearby.

## Other extinction events

Paleontologists and geologists have identified four other major extinction events. All of these came before the K-T extinction. Each is named for the geologic time it corresponds to. They are: the End-Triassic, the End-Permian, the Late Devonian and the Ordovician.

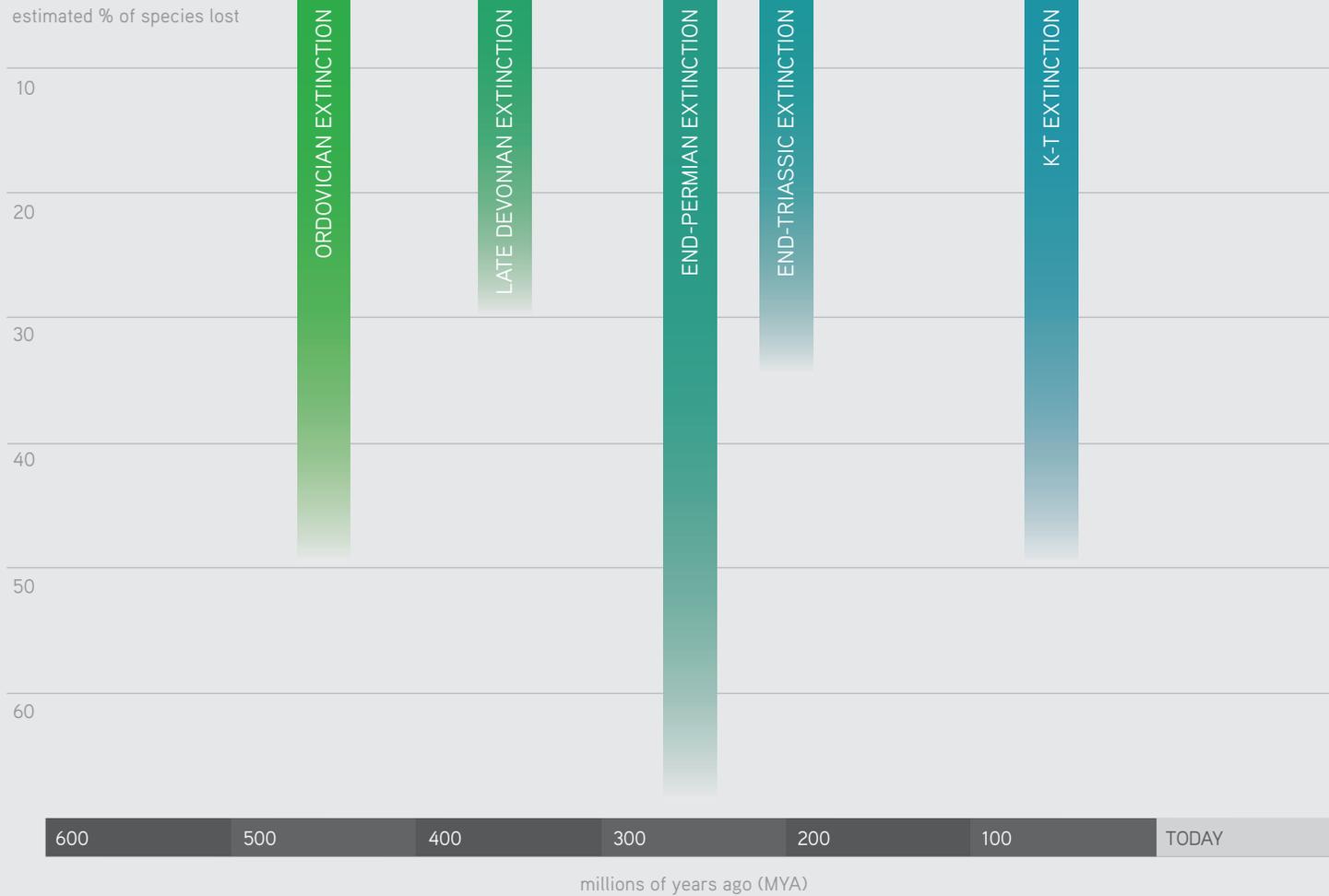
The End-Permian was the hugest of the five major extinctions. It was the mother of all extinction events.

In it, about 95 percent of marine species and 70 percent of land species were lost. The dying off lasted for 165,000 years. Environmental changes both sudden and gradual greatly changed conditions on Earth.

Very few creatures made it through the End-Permian extinction. Cockroaches did — and ginkgo trees and horseshoe crabs. So did our ancestors, small protomammals (early mammals) that had evolved from reptiles: they were furry and warm-blooded, but still laid eggs.

# MASS EXTINCTIONS

THE FIVE MAJOR MASS EXTINCTION EVENTS



## Possible causes of extinctions

Most geologists and paleontologists agreed that the cause of the K-T extinction was an asteroid or comet hitting Earth. Many of them hypothesized that objects from space had caused all the major extinctions.

That proved false. Studies of fossil layers from earlier extinctions showed that life forms had disappeared gradually, not suddenly, as they had in the K-T event.

The discussion about what causes mass extinctions continues. Scientists do not yet fully understand the reasons for them. Some possible explanations are:

- Volcanic activity. Scientists have found huge lava plains that coincide with extinction events. Volcanoes give off carbon dioxide, which results in global warming. They also send out dust and aerosols that slow photosynthesis, causing food chains to collapse.
- Rapidly changing climate.
- Impact or multiple-impact events.
- Anoxic events — ocean layers losing their oxygen.
- Changing position of oceans and continents (plate tectonics).

Some combination of these causes may have taken place. Paleontologist Peter Ward made this hypothesis in 2006 to explain the four other major extinctions:

A “sudden” increase of carbon dioxide and methane in the atmosphere occurred, caused by volcanoes. The warmer world disrupted ocean circulation patterns and currents. Without the mixing of the ocean layers, the bottom water became anoxic, without oxygen. This allowed green sulfur bacteria, which live on sulfur not oxygen, to expand. They produced hydrogen sulfide. The hydrogen sulfide bubbled up, killing much of life and destroying the ozone layer. Without the ozone, life was unprotected from the Sun’s ultraviolet rays.

Ward’s hypothesis suggests that humans must reduce the carbon dioxide we produce. If we don’t, we may start a similar chain of events.

## A sixth major extinction?

Many biologists agree that a sixth major extinction is happening today. This one is the result of humans degrading and destroying the habitats of other life forms.

This extinction apparently began about 50,000 years ago. Humans moving into Australia and the Americas caused the disappearance of many species.

No one knows how many species currently exist on Earth. The best estimate is about 8.7 million, not counting microorganisms. To date, only a small fraction of these estimated species have been identified, but new ones are constantly discovered and named.

Today it is thought that one in four known mammal species is threatened with extinction in the next several decades. One in eight known bird species is at risk. Biologists fear that we could lose 50 percent of all known living species by the end of this century.

## Sources

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