

Earth's Five Mass Extinctions

In Earth's 4.6 billion years of life history, scientists theorize there have been five major mass extinctions when more than 50 percent of species disappeared. These extinctions have been caused by a series of catastrophic events that changed environmental conditions causing many species to disappear completely, although some still survived. These catastrophic events range from volcanic activity, asteroid, meteor or comet impact, sea level falls, and tectonic movement of Earth's plates. Each of these events brought changes in Earth's atmosphere, ground, or water resulting in changes to the coincidental life existing at that period. The consequences of many of these events result in changes to Earth's gases such as CO₂ and oxygen levels in both the atmosphere and in the oceans. If CO₂ levels are high, the Earth's temperature rises to unlivable levels. If ocean oxygen levels decline, life forms die off. If either an asteroid hits Earth or volcanoes erupt, the resulting debris can block out the sun causing the release of toxic gases or the death of plants. As some species die off, such events mark the end of periods of dominance by some organisms and allow for others to step in. For example, mammals flourished after dinosaurs went extinct.

The first mass extinction event occurred 440 million years ago and is called the Ordovician-Silurian extinction. This is the second largest extinction event and was marked by an intense ice age, resulting in sea level fall. At the time, marine organisms were the most dominant form of life, although the first land plants had also appeared. However, 85 percent of sea life died off in this extinction.

The second mass extinction was drawn out over a course of 20 million years and is called the Late Devonian extinction. It occurred 360 million years ago. Prior to this extinction, insects and plants were on the land, but there were no land mammals yet. This period was also the age of fish. One theory is that at the time, as vascular plants (trees, flowering plants, and ferns) grew and their roots broke up rock, nutrients were released in the surrounding waters and this sped up the growth of algae. As bacteria broke down large growths of algae, oxygen was used up in the process, thus robbing other marine organisms of this source and possibly leading to their death. Three-quarters of species died off.

The third mass extinction, and the deadliest, was the Permian-Triassic extinction that occurred 250 million years ago. Evidence found in Australia and Antarctica indicates that an asteroid might have occurred at this time. Tiny quartz crystals marked with microscopic fractures were found, and these had to have been caused by something with great force such as an asteroid. A crater 75 miles wide and more than 3 miles across was also found. Additionally, the Siberian Trap, a volcanic event at this time is being studied extensively. A volcano would have blocked the sun, released toxic gases, decreased temperatures, increased glaciation, tied up ocean water, and lowered sea levels. 90 percent of both marine and land species died off.

The Triassic Jurassic extinction occurred 200 million years ago, and 20 percent of marine families, mammal-like animals, large amphibians, and non-dinosaurs were lost. Massive lava flows, coined the "Atlantic Magma," have been identified and could be one factor in changing the Earth's climate and causing the extinction. During this period, the supercontinent Pangea began to separate causing a rift in the seafloor. As the North American continent broke apart

from the European continent, the Atlantic Ocean began to form. As this occurred, volcanic activity emerged. Huge amounts of CO₂ were released and caused global warming. As many as 75 percent of species went extinct.

The Cretaceous Tertiary extinction occurred 65 million years ago when dinosaurs ruled the Earth. Much evidence points to an asteroid or comet hitting the Earth. High concentrations of iridium from a comet or asteroid have been found. A huge crater found off the Yucatan Peninsula in Mexico is thought to be where the asteroid landed. Also, evidence of a fern spike in the fossil record indicates a disruption of ecosystems. As much as 75 percent of the planet's species suddenly went extinct. Dinosaurs went extinct, but most mammals, turtles, crocodiles, salamanders, frogs, and birds survived.