

Lesson 19: The Great Dying

About 252 million years ago, life on Earth nearly ended. Not in a day, not in a century, but over thousands of years, conditions on Earth became so hostile that creature after creature, species after species, ecosystem after ecosystem, collapsed. By the time it was over, about 96 percent of all marine species and 70 percent of all land species were gone. Scientists call this catastrophe the **Great Dying**, and it was the worst **mass extinction** in the history of life, far more devastating than the asteroid that later killed the dinosaurs.

The cause was volcanic. In what is now Siberia, a region of Earth called the Siberian Traps erupted in pulses for hundreds of thousands of years, releasing staggering amounts of carbon dioxide into the atmosphere. As **carbon dioxide** built up, Earth's temperature rose rapidly in a runaway **greenhouse effect**. The oceans warmed and lost oxygen. They also absorbed carbon dioxide and became more acidic, a process called **ocean acidification**, which dissolved the shells of marine creatures and collapsed reef ecosystems that had taken millions of years to build. The combination of heat, low oxygen, and acid was devastating.

The world that emerged from the Great Dying was almost unrecognizable. The rich Permian forests were gone. The therapsids were mostly gone. The complex marine ecosystems, trilobites, coral reefs, ancient fish, were gone. Earth was nearly silent. But a few survivors remained, huddled in whatever corners of the world had been spared the worst: some reptiles, some early mammal relatives, some insects, some plants. And from those survivors, over millions of years, life would rebuild itself. Different, but alive.

The Great Dying is perhaps the most powerful reminder in the entire story of life of how connected living things are to the chemistry and climate of the planet. Earth's living systems are resilient, but they are not invincible. When the conditions that support life change drastically and quickly, life changes with them, or it disappears. And in the silence left behind, something new begins.