



CLEMSON UNIVERSITY — Algae, not asteroids, were the key to the end of the dinosaurs, say two Clemson University researchers. Geologist James W. Castle and Ecotoxicologist John H. Rodgers have published findings that toxin-producing algae were a deadly factor in mass extinctions millions of years ago.

The research not only provides new insights into the past but also offers a caution about the future. The scientists say that current environmental conditions show significant

similarity to times when previous mass extinctions occurred.

Castle is presenting the research results at the Geological Society of America meeting in Portland, Ore. He and Rodgers have spent two years analyzing data from ancient algal deposits — stromatolite structures — finding evidence that blue-green algae, which produce poisons and deplete oxygen, were present in sufficient quantities to kill off untold numbers of plants and animals living on land or in the sea.

The scientists introduced their theory in "Hypothesis for the role of toxin-producing algae in Phanerozoic mass extinctions based on evidence from the geologic record and modern environments." The paper was published in the March 2009 issue of the peer-reviewed journal *Environmental Geosciences*.

The research confronts current theories about what caused five major extinctions and a number of minor die-offs during the 545-plus million years during which life with "hard parts" — skeletons and shells — has flourished and left fossils. Phanerozoic is Greek for "visible life" and is the present eon in the Earth's 4.5 billion-year existence.

Other researchers have theorized that climate changes, sea level, volcanic activity, even asteroids, were primary causes of death of more than 50 percent of life on Earth. Castle and Rodgers claim that these causes were contributors, but algae were the mass killers. They point out that asteroid-caused extinction, a popular theory for the end of dinosaurs, does not fit the evidence.

"The fossil record indicates that mass extinctions... occurred in response to environmental changes at the end of the Cretaceous; however, these extinctions occurred more gradually than expected if caused solely by a catastrophic event," they wrote.

Perhaps most provocative is the conclusion of Castle and Rodgers that "this hypothesis gives us cause for concern and underscores the importance of careful and strategic monitoring as we move into an era of global climate change." The scientists state that the level of "modern toxin-producing algae is presently increasing, and their geographic distribution is expanding..."

Rodgers has been surprised by the response to the publication of the paper. "Scientists from around the world have been sending us data that support our hypothesis and our concern about the future," said Rodgers. "I look forward to the debate this work will generate. I hope it helps focus attention on climate change and the consequences we may face."

Did algae contribute to mass extinctions?

National Public Radio's Science Friday, Oct. 23, 2009

Forget asteroids — a new theory says algae were the key to the dinosaurs' extinction millions of years ago. **Ecotoxicologist John Rodgers of CLEMSON UNIVERSITY** details the evidence that he and **colleague Jim Castle, a geologist**, have compiled. He also explains why some algae can be harmful in large quantities, even to present day animal populations.

<http://www.npr.org/templates/story/story.php?storyId=114081479>

Other coverage:

Killer algae a key player in mass extinctions

U.S. News & World Report, Oct. 21, 2009

<http://www.usnews.com/science/articles/2009/10/21/killer-algae-a-key-player-in-mass-extinctions.html>

Toxic algae 'wiped out dinosaurs'

Telegraph (U.K.), Oct. 20, 2009

<http://www.telegraph.co.uk/science/dinosaurs/6374619/Toxic-algae-wiped-out-dinosaurs.html>

Did toxic algae wipe out the dinosaurs?

The Mirror (U.K.), Oct. 20, 2009

<http://www.mirror.co.uk/news/top-stories/2009/10/20/did-toxic-algae-wipe-out-the-dinosaurs-115875-21759996/>

Algae the dino killer

The Sun (U.K.), Oct. 20, 2009

<http://www.thesun.co.uk/sol/homepage/news/2689870/Dinosaurs-wiped-out-by-algae-not-asteroids-claim-scientists.html>

Killer algae wiped dinosaurs, may wipe humans, study suggests

Russia Today, Oct. 20, 2009

http://www.russiatoday.com/Top_News/2009-10-20/killer-algae-wiped-dinosaurs.html