Spring 4-15-1992

# What Happened to the Dinosaurs? IWU Chemistry Professor Has the Answer

Stew Salowitz
*Illinois Wesleyan University*

ILLINOIS WESLEYAN UNIVERSITY

**NEWS SERVICES**
P.O. Box 2900
Bloomington, IL 61702-2900
(309) 556-3181

*Date:* April 15, 1992
*Contact:* Stew Salowitz

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BLOOMINGTON, Ill. -- From careful examination of footprints and bones, paleontologists are learning more and more every day about dinosaurs - their social structure, family life, even their mating habits.

Such scientific data may be fine for paleontology students, anatomists, or those who want to know what life was like 75 to 100 million years ago.

But youngsters, often infatuated with dinosaurs as popular characters in television situation comedies, cartoons, dolls, and books, have a more fundamental question: What happened to the dinosaurs?

Illinois Wesleyan University assistant professor of chemistry Wendy Wolbach has the answer, and her scientific explanation of the controversial theory about the dinosaurs' disappearance has been given considerable weight among mass extinction scholars.

It is documented that, for approximately 160 million years during the Cretaceous geological period, dinosaurs roamed (if not ruled) the Earth, but they were gone by the Tertiary period. Wolbach has concluded, through detailed research, that a meteorite struck the Earth 66 million years ago (between the two geological periods), generating a global firestorm and causing such environmental stress as constant darkness, cold, acid rain, greenhouse warming, along with the raging, widespread fires.

This theory was first proposed by Walter and Luis Alvarez, Frank Asaro, and Helen Michel, all working out of the University of California at Berkeley, and soon found support among a number of scientists, including Wolbach, whose research supports the impact theory, with special emphasis on the firestorm.

As a graduate student and National Aeronautics and Space Administration Fellow at the University of Chicago in 1984, Wolbach began examining a sample of the Earth's rocky crust, carved from the boundary between the Cretaceous and Tertiary geological periods.

The clay from the sample, taken from Woodside Creek, New Zealand, revealed large amounts of iridium and carbon. "The evidence of carbon indicates soot from a major fire, probably associated with the impact, thus leading to the extinction," Wolbach says. "The key is the iridium found in the Cretaceous-Tertiary rock's layer. Iridium is an element rare on Earth's surface but common in meteorites such as carbonaceous chondrites, other asteroids or, possibly, comets."

Wolbach estimates the meteorite was approximately six miles in diameter and was traveling at 22 miles per second, and says the heat of the fireball's impact could have ignited fires up to 600 miles away. She also says a meteorite of such magnitude and speed wouldn't necessarily have had to crash on land to trigger the fires. The current theory supports an impact site in Central America, possibly in the ocean and near shore.

"The meteorite vaporized when it hit, starting fires, and throwing meteorite and crater dust and soot into the atmosphere, causing a drag heating effect as the winds carried it," Wolbach says. "This layer of soot and dust would have blocked out sunlight, causing the forests to dry out and die, making them ripe for additional large fires ignited by lightning. In fact, to get the amount of soot found, as much as 90 percent of the forests in the world must have burned."

After the combination of darkness, cold, lack of food, and fires, why did some creatures and plants become extinct while others survived? "There may have been pockets of sunlight amid the darkness from the dust cloud," Wolbach suggests. "Mobility would have enhanced survival. For example, dinosaurs that had already evolved into birds, such as the California condor, escaped extinction. And there are theorists who believe modern birds evolved from small, meat-eating flying dinosaurs."

Armed with the knowledge that a meteorite has done this kind of destruction before, it is safe to wonder whether the history of 66 million years ago could repeat itself. "There are about 130 of these Apollo asteroids of varying sizes crossing Earth's orbit, and estimates are that one hits Earth every 200 to 300 years," says Wolbach. "So this kind of thing could happen again anytime."

Wolbach points out that in January 1991 an asteroid approximately 33 feet in diameter came within 170,000 miles of Earth, and in March 1989 an asteroid of 248 miles in diameter passed within 682,000 miles of Earth.

The results of Wolbach's research were published in the June 1989 *National Geographic Magazine* feature, "The March Toward Extinction", and when she joined the IWU faculty last fall, she had no idea of the school's pre-existing link to *National Geographic*.

Explorer-geologist John Wesley Powell, one of Wolbach's professorial predecessors on the Wesleyan faculty, was among the 33 founders of the Society in 1888. And the current National Geographic Society's board of trustees includes former astronaut Frank Borman, who was awarded an honorary degree by IWU at the 1969 dedication of the Evans Observatory on campus.

Wolbach earned her bachelor's degree from Franklin and Marshall and received her master's and doctorate from the University of Chicago. She has also completed a post-doctoral fellowship in analytical chemistry.

For further information, contact Wendy Wolbach at (309) 556-3187.