UWM RESEARCHERS LINK ASTEROID STRIKE TO MASSIVE COAL BEDS

by Laura L. Hunt

What wiped out the dinosaurs on the North American continent 65 million years ago may also have been responsible for the rich deposits of coal that now cover Montana and North Dakota, according to two UWM researchers.

Peter Sheehan, adjunct professor of geosciences and curator of geology at the Milwaukee Public Museum, and Claudia Barreto, associate professor of biological sciences, have uncovered evidence in the last several years that the dinosaur extinction in North America was the result of an asteroid hitting Earth.

Now Sheehan and Barreto are exploring the next possible result of an asteroid pounding: They believe the extraterrestrial event and the months of darkness it spawned is behind the coal formation in northeastern Montana and the western half of North Dakota, the largest known deposit of lignite in the world, according to the U.S. Geological Survey.

Alan Magayne-Roshak

Peter Sheehan (left), adjunct professor of geosciences and curator of geology at the Milwaukee Public Museum, and Claudia Barreto, associate professor of biological sciences, have been working in the Hell's Creek Formation, a dinosaur fossil area in Montana, for years. Now John Isbell (right), professor of geoscience, will join the research effort.

DEATH OF THE DINOSAURS

Their coal theory resulted from years of research on the question of what caused the massive dinosaur extinction in North America.

"We've been the census-takers for the last 2.1 million years of dinosaur existence," says Barreto of their archaeological digs in the Hell's Creek Formation of Montana. Barreto, who worked as a paleontologist at the Milwaukee Public Museum before moving into academics, has

dug at the Montana fossil site with Sheehan since the late 1980s.

With the help of numerous volunteers, they have collected several thousand fossils that seem to support their theory that the dinosaurs were vibrant right up to a quick and sudden end. But the work also indicates that the animal extinction left vast stretches of vegetation to grow and then die untouched by predators – the perfect condition for the long process of coal formation to begin.

GLOBAL DARKNESS

Coal is formed when dead plant matter accumulates in wet conditions and is covered over by layers of sand and clay over millions of years. The carbon in plants is what gives coal its energy.

The idea that a giant asteroid slammed into the Yucatan Peninsula at about the same time as the dinosaur extinction is widely accepted by scientists, says Sheehan. He says he can spot the layer of earth in the Hells Creek Formation that marks when the impact occurred. Such an event would have spread vapor across the continent and sent debris up into the atmosphere.

The dust from that fallout went all over the Earth and sent the planet into five months of darkness, says Sheehan. "There was absolutely no sunlight," he says. "The extended darkness killed the plants and everything that fed on plants."

As they do after a forest fire, the plants eventually regenerated by their root systems and seed production. But herbivores and the animals that ate them did not. Small mammals survived because they had not yet evolved into herbivores, says Sheehan. They ate insects and worms, which fed off dead matter (like rotting logs). "That part of the food chain survived," he says.

THE RECOVERY PHASE

From that point on, with no predators to eat them, plants grew uninhibited. At the end of each season, dead plant matter would lie where it fell until it was covered over.

"Now we're looking at what happened during the recovery phase," says Sheehan. "Because all the plants died initially, there was a lot of erosion. We know that from observing the effects after a forest fire. Without plants there is widespread flooding and threat of mud slides. Tons of sediment pour into the streams and rivers, causing them to rise. This would have created ponding and swampy areas."

Not everyone agrees with the two hypotheses – either of the dinosaurs' demise or the formation of the coal fields – but Sheehan and Barreto feel they have enough evidence to continue exploring the notion.

For this phase of the research, they have enlisted the help of John Isbell, associate professor of geology and a sedimentologist, who will help determine what happened downstream from such large-scale erosion.

"He will look at rocks laid right after the asteroid hit," says Barreto. "There are things that happened ecologically at the time that could lead to the kinds of sediments we were seeing. John can help us identify those events."

Sheehan, Barreto, and biostatistician Raymond Hoffmann at the Medical College of Wisconsin published a summary of their dinosaur extinction research in 2000, and it promptly received widespread media attention.