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Wyoming fossils change theories about extinction

By DAN WHIPPLE Special to the Star-Tribune

DENVER -- Scientific work on Wyoming fossils is changing the understanding of extinction of insects and plants in a rapidly changing climate.

One of the most important findings is that there was a widespread extinction of insects at the same time as the disappearance of the dinosaurs. Because of an absence of direct insect fossils from the Cretaceous-Tertiary (K-T) time boundary about 65 million years, many scientists had previously believed that there had not been a mass extinction of insects at the same time the dinosaurs disappeared.

However, by doing some clever work with well preserved plant fossils from that period, several scientists --- Peter Wilf, associate professor of geosciences at Penn State University; Kirk Johnson, curator of paleontology at the Denver Museum of Nature and Science; and Scott Wing and Conrad Labandeira of the Smithsonian Institution -- have pieced together the likely extinction of about 79 percent of North American insect species at the K-T boundary.

The scientists worked with fossils collected in Wyoming's Bighorn and Green River basins.

Because of their small size and vast numbers, insect species have generally been believed to be less susceptible to extinction events than larger animals. According to a paper assessing modern extinction rates by British scientists Robert May and John Lawton, only 0.006 percent of known insect species have actually gone extinct since 1600, and only 0.09 percent are threatened.

While there aren't any insect fossils from the K-T boundary, there are a lot of plant fossils. Wilf and his compatriots looked at insect feeding on fossil plants. Wilf said in an interview, "There is a really robust signal there across the K-T boundary of a loss not only of at least half of the plant species, but also of specialized types of insect feeding."

The critical event driving extinctions at the K-T boundary was the impact of an asteroid the size of San Francisco into the Gulf of Mexico moving at cosmic speeds. It exploded the impact of a million Hiroshima bombs and sent up enough dust and debris into the atmosphere to block out the sun

for several years.

This, in turn, blocked photosynthesis, cutting off the primary production of life. Plants died. Many insects specialized in eating only one kind of plant. So if their food source died out, so did they.

"Current human activities are like the K-T boundary," Wilf said. "A hundred years of habitat loss, climate change and deforestation may not seem like very much. But on a geologic time scale it is like an asteroid hitting the earth.

"The fossil record offers us this laboratory experiment that already happened. It gives us an opportunity to observe major extinction events that have occurred," he said.

While Wilf said that you can't draw a one-to-one correspondence between past and present conditions, he said that 50 percent of the insects today are specialized feeders, utilizing only one or two plant species for food. And in the modern era, many plant species are in danger of extinction. Wilf said that as many as 50 percent could be gone in 100 years.

After the K-T extinctions, he said, "Plant diversity does not return for about 12 million years."

The lessons from strictly a global warming perspective are not all negative, however. The earth warmed after the K-T boundary and 12 million years later at the Paleocene-Eocene boundary. Wilf said, "The early Eocene 52 million years ago was the warmest the earth has been in the last 100 million years, and that warming lasted for two million years."

This was the period when plant and insect species diversity recovered.

"There is strong evidence for high diversity when temperatures were warm," he said. However, he said that because of human activity, the modern situation is more like the K-T situation than the gradual warming of the P-E period.

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