Insect discovery sheds light on climate change

July 11 2013

Fossil of a newly discovered family of extinct scorpionflies from McAbee, B.C.

(Phys.org) —Simon Fraser University biologists have discovered a new, extinct family of insects that will help scientists better understand how some animals responded to global climate change and the evolution of communities.

The Eocene Apex of Panorpoid Family Diversity, a paper by SFU's Bruce Archibald and Rolf Mathewes, plus David Greenwood from Brandon University, was recently published in the *Journal of Paleontology*.

The researchers named the new family the Eorpidae, after the Eocene Epoch, the age when these insects lived some 50 million years ago. The

fossils were found in British Columbia and Washington state, most prominently at the McAbee Fossil Beds near Cache Creek, B.C.

This new family raises questions about its extinction. Insect families have steadily accumulated since before the Eocene, with few, scattered losses—apart from the distinct exception of a cluster of family extinctions within a group of scorpionflies that includes the Eorpidae.

"The Eorpidae was part of a cluster of six closely related families in the Eocene, but today this group is reduced to two. Why were these different?" says Archibald. "We believe the answer may lay in a combination of two large-scale challenges that would have hit them hard: the evolutionary diversification of a strong competitive group and global climate change."

In a major evolutionary diversification, ants evolved from a small group to become major ecological players in the Eocene, now competing with these scorpionflies for the same food resource in a whole new, efficient manner.

The colourful fossil wing of a newly discovered family of extinct scorpionflies found in Republic, Wash.

Global climates were much warmer 50 million years ago, associated with increased atmospheric carbon, a relationship that scientists see today. Along with this, winters were mild, even in the cool, higher elevations where these insects lived. Average temperatures there were similar to modern Vancouver, but with few—if any—frost days.

When climates outside of the tropics later cooled, temperature seasonality also widened, forming the modern pattern of hot summers and freezing winters. Plant and animal groups that inhabited Eocene uplands either had to evolve tolerance for colder winters, migrate to the hot tropics and adapt to that climate, or go extinct.

"These scorpionfly families appear to have retained their need to inhabit cooler climates, but to persist there, they would need to evolve toleration for cold winters, a feat that only the two surviving families may have accomplished," Archibald explains. "Understanding the evolutionary history of these insects adds another piece to the puzzle of how animal communities change as climate does—but in this case, when an interval of global warming ends."

Simon Fraser University is Canada's top-ranked comprehensive university and one of the top 50 universities in the world under 50 years old. With campuses in Vancouver, Burnaby and Surrey, B.C., SFU engages actively with the community in its research and teaching, delivers almost 150 programs to more than 30,000 students, and has more than 120,000 alumni in 130 countries.

Provided by Simon Fraser University

from https://phys.org/news/2013-07-insect-discovery-climate.html