

Fossil palm beetles 'hindcast' 50-million-year-old winters

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(Phys.org) —Fifty-million-year-old fossil beetles that fed only on palm seeds are giving Simon Fraser University biologists Bruce Archibald and Rolf Mathewes new information about ancient climates.

According to their research, published online this week in *The Proceedings of the National Academy of Sciences*, these fossil beetles indicate that during a period of global warming in the geological past, there were mild, frost-free winters extended even in the uplands of ancient western North America.

Working with co-authors Geoffrey Morse of the University of San Diego, California, and David Greenwood of Manitoba's Brandon University, researchers used fossil beetles to determine winter temperatures where they couldn't place a thermometer—in the 50-million-year-old uplands of British Columbia and Washington.

The key to their study was finding a particular group of beetles that only feed on palms.

"The natural distribution of palms is limited today to regions without significant frost days, which their seeds and seedlings can't survive," Archibald explains. "A cooler upland with palms indicates a specific climate type, where a temperate average yearly temperature—rather like Vancouver today—had [warmer winters](#) where palms can complete their lifecycles."

But since detecting palm fossils is difficult, the research duo developed a new technique—they used the beetle fossils to test for the [palms'](#) presence.

Understanding more about these temperate, yet mild winter climates by looking to the deep past may help show how natural communities are impacted by climate change, says Archibald. "We see this happening today in significant ways—warm the winters a little, and you get big changes, such as the explosion of [mountain pine beetle](#) populations that strongly affect forests and the people and economies that depend on them.

"Using the fossil record to understand climates of the deep past that had significant similarities to climates that we are now encountering may help forearm us with knowledge that will be important to our future as we increasingly experience the effects of [global warming](#)."

More information: S. Bruce Archibald, Geoffrey E. Morse, David R. Greenwood, and Rolf W. Mathewes. "Fossil palm beetles refine upland winter temperatures in the Early Eocene Climatic Optimum." *PNAS* 2014 ; published ahead of print May 12, 2014, [DOI: 10.1073/pnas.1323269111](#)

Provided by Simon Fraser University

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