

Ancient insects shed light on biodiversity

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Tiny fossil fly from an ancient mountain valley in British Columbia

(Phys.org)—Simon Fraser University evolutionary biologists Bruce Archibald and Rolf Mathewes, and Brandon University biologist David Greenwood, have discovered that modern tropical mountains' diversity patterns extended up into Canada about 50 million years ago.

Their findings confirm an influential theory about change in modern [species diversity](#) across mountains, and provide evidence that [global biodiversity](#) was greater in ancient times than now. The scientific journal *Palaeogeography, Palaeoclimatology, Palaeoecology* has published their research.

About 45 years ago, an [evolutionary biologist](#) at the University of Pennsylvania theorized that change in species from site to site across mountain ranges in the tropics should be greater than in temperate latitudes.

Daniel Janzen reasoned that the great difference between summer and winter in temperate latitudes (high seasonality) offers a wide window to migrate across mountainous regions. The small difference in the tropics (low seasonality) allows a very narrow opportunity, annually. Consequently, communities across tropical mountains should have fewer of the same species. Many studies examining modern communities support this theory.

Archibald, Mathewes and Greenwood realized that fossil beds across a thousand kilometres of the ancient mountains of British Columbia and Washington provided a unique lens through which to deepen evaluation of this theory.



SFU biologists Bruce Archibald (left) and Rolf Mathewes examine fossil fly wings they discovered in a biodiversity study.

Fifty million years ago, when these [fossil beds](#) were laid down, the world had low seasonality outside of the tropics, right to the poles. Because of this, if Janzen's theory is right, the pattern of biodiversity that he described in modern tropical mountains should have extended well into [higher latitudes](#).

"We found that [insect species](#) changed greatly across British Columbia's and Washington State's ancient mountain ranges, like in the modern tropics," Archibald says, "exactly as Janzen's seasonality hypothesis predicted.

This implies that it's the particular [seasonality](#) now found in the modern tropics, not where that climate is situated globally, that affects this biodiversity pattern." He adds: "Sometimes it helps to look to the ancient

past to better understand how things work today."

The findings also bolster the idea that ancient Earth was a much more diverse world than now with many more species.

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

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