

Study shows that Vikings enjoyed a warmer Greenland

February 6 2019



This is a 21st-century reproduction of Thjodhild's church on Erik the Red's estate (known as Brattahlíð) in present day Qassiarsuk, Greenland. Credit: G. Everett Lasher/Northwestern University

A new study may resolve an old debate about how tough the Vikings actually were.

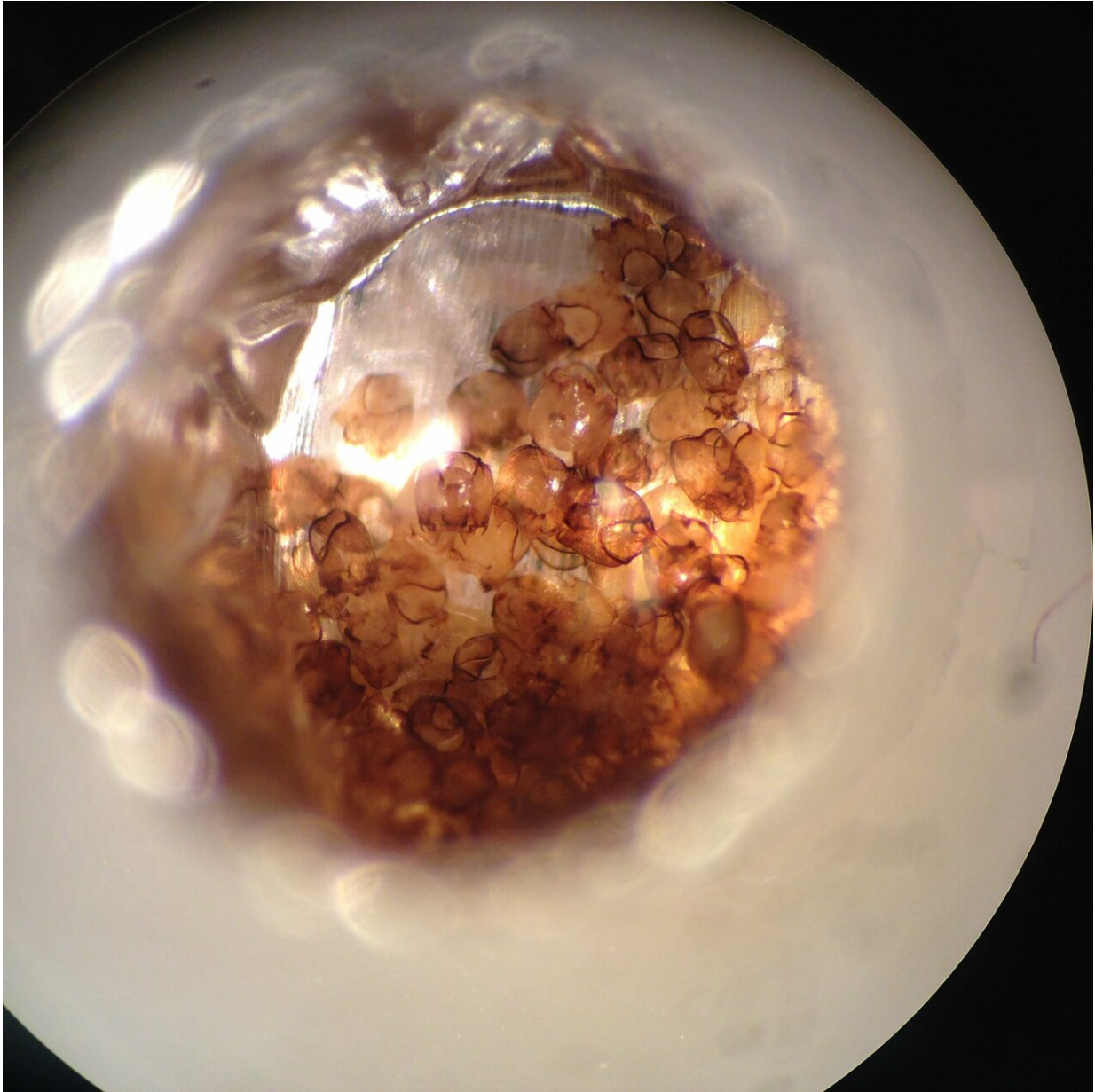
Although TV and movies paint Vikings as robust souls, braving [subzero temperatures](#) in fur pelts and iron helmets, new evidence indicates they might have been basking in 50-degree summer weather when they settled in Greenland.

After reconstructing southern Greenland's [climate](#) record over the past 3,000 years, a Northwestern University team found that it was relatively warm when the Norse lived there between 985 and 1450 C.E., compared to the previous and following centuries.

"People have speculated that the Norse settled in Greenland during an unusually, fortuitously warm period, but there weren't any detailed local temperature reconstructions that fully confirmed that. And some recent work suggested that the opposite was true," said Northwestern's Yarrow Axford, the study's senior author. "So this has been a bit of a climate mystery."

Now that climate mystery finally has been solved.

The study will publish on Feb. 6 in the journal *Geology*. Axford is an associate professor of Earth and planetary sciences in Northwestern's Weinberg College of Arts and Sciences. The study is a part of Northwestern Ph.D. candidate G. Everett Lasher's dissertation research, based in Axford's lab.



Collected and cleaned chironomid head capsules are prepped for isotope analysis. Credit: G. Everett Lasher/Northwestern University

To reconstruct past climate, the researchers studied lake sediment cores collected near Norse settlements outside of Narsaq in southern Greenland. Because lake sediment forms by an incremental buildup of

annual layers of mud, these cores contain archives of the past. By looking through the layers, researchers can pinpoint climate clues from eons ago.

For this study, Lasher analyzed the chemistry of a mix of lake fly species, called chironomids, trapped inside the layers of sediment. By looking at the [oxygen isotopes](#) within the flies' preserved exoskeletons, the team pieced together a picture of the past. This method allowed the team to reconstruct [climate change](#) over hundreds of years or less, making it the first study to quantify past temperature changes in the so-called Norse Eastern Settlement.

"The oxygen isotopes we measure from the chironomids record past lake water isotopes in which the bugs grew, and that lake water comes from precipitation falling over the lake," said Lasher, first author of the paper. "The oxygen isotopes in precipitation are partly controlled by temperature, so we examined the change in oxygen isotopes through time to infer how temperature might have changed."

Because recent studies concluded that some glaciers were advancing around Greenland and nearby Arctic Canada during the time Vikings lived in southern Greenland, Axford and Lasher expected their data to indicate a much colder climate. Instead, they found that a brief warm period interrupted a consistent cooling climate trend driven by changes in Earth's orbit. Near the end of the [warm period](#), the climate was exceptionally erratic and unstable with record high and low temperatures that preceded Viking abandonment of Greenland. Overall, the climate was about 1.5-degrees Celsius warmer than the surrounding cooling centuries. This warmer period was similar to southern Greenland's temperatures today, which hover around 10-degrees Celsius (50-degrees Fahrenheit) in summer.

In another surprise, Axford and Lasher found that the North Atlantic

Oscillation (NAO)—a natural fluctuation in atmospheric pressure that is often responsible for climate anomalies in the region—probably was not in a dominantly positive phase for multiple Medieval centuries as had been hypothesized. (When the NAO is in its positive phase, it brings cold air to much of Greenland.)



An up-close look at a chironomid's head capsule(center) under a microscope. The

Northwestern team isolates these exoskeletons from sediment cores collected in southern Greenland for oxygen isotope analysis. Credit: G. Everett Lasher/Northwestern University

"We found that the NAO could not explain Medieval climatic changes at our site," Lasher said. "That might call into question its use in explaining long-term climate change over the last 3,000 years elsewhere."

So what did cause the Vikings' fortuitously warm climate? Lasher and Axford aren't sure but speculate it might have been caused by warmer ocean currents in the region. The new data will be useful for climate modelers and climate researchers as they seek to understand and predict what might be in store for Greenland's ice sheet as Earth warms rapidly in the future.

"Unlike warming over the past century, which is global, Medieval warmth was localized," Axford said. "We wanted to investigate what was happening in southern Greenland at that time because it's a climatically complex part of the world where counterintuitive things can happen."

The Norse settlements in Greenland collapsed as local climate apparently became exceptionally erratic, and then ultimately consistently cold. But Axford and Lasher will leave it to the archaeologists to determine whether or not climate played a role in their departure.

"We went in with a hypothesis that we wouldn't see warmth in this time period, in which case we might have had to explain how the Norse were hearty, robust folk who settled in Greenland during a cold snap," Lasher said. "Instead, we found evidence for warmth. Later, as their settlements died out, apparently there was climatic instability. Maybe they weren't as resilient to climate change as Greenland's indigenous people, but climate

is just one of many things that might have played a role."

More information: "Medieval warmth confirmed at the Norse Eastern Settlement in Greenland" *Geology* (2019).

Provided by Northwestern University

Citation: Study shows that Vikings enjoyed a warmer Greenland (2019, February 6) retrieved 26 April 2024 from <https://phys.org/news/2019-02-vikings-warmer-greenland.html>

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