Glacial microbes gobble methane

Bacteria in Greenland's melting ice sheet may consume the potent greenhouse gas

BY **BETH MOLE** 1:22PM, APRIL 25, 2014

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ICY MICROBES In melt streams under Russell Glacier (shown), a glacier at the western edge of the Greenland Ice Sheet, researchers found bacteria that can gobble up methane as it gurgles out from under the glacier.

BRENT CHRISTNER/LSU

Glacier-capped methane, poised to exacerbate global warming as it bubbles out from melting glaciers, may meet its end in the very ice from whence it came.

Microbes at the melting margins of Greenland's ice sheet can gobble up the mighty greenhouse gas as it seeps from under thawing ice, researchers say. The finding suggests that these ice-capped stores of methane may have less of an impact on global climate than some scientists have feared (*SN: 4/10/10, p. 15*).

Methane escaping from under the world's melting glaciers and the ice sheets of Greenland and Antarctica comes from microbes aptly called methanogens, which live deep below the ice with no oxygen. There, the microbes feast on carbon and belch out methane.

Now scientists have discovered that another mix of microbes, lurking in the outer layers of ice, dine on the greenhouse gas as it gurgles out from under the glacier. Trickles of oxygen-bearing water snaking through cracks in the ice rouse these bacteria, which use methane for food, says microbiologist Brent Christner of Louisiana State University in Baton Rouge. "They could be a really important sink for methane," he says. These bacteria use oxygen to break down methane; the result is water and carbon dioxide, a gas with about one-twentieth of the heat-trapping power

of methane.

Christner and colleagues found the methane-munching microbes in drainage from the base of Russell Glacier, on the western edge of Greenland's ice sheet, during the summer melts of 2012 and 2013. By collecting water from the top of the ice and from below it, the team sorted out which microbes that lived on the icy edges and which had probably traveled from the deep underbelly of the glacier.

In the drainage from the glacier's core, the researchers found methane-making microbes and their calling card: high concentrations of methane. The methane-feasting microbes thriving in the outer edges of the glacier, the team found, could chew up more than 98 percent of that methane in about 30 days. The findings appear April 17 in the *ISME Journal*.

However, the researchers don't know how long it takes methane-loaded water to trickle out of a glacier and provide a buffet for bacteria, Christner says. Compared with the 30-day time frame, he says "it's probably a lot shorter." If the methane moves out of the ice faster, methane-hungry bacteria wouldn't devour all of the gas before some of it escapes to the atmosphere. Despite researchers' not knowing the true timing of events, the finding offers a glimpse of methane's unseen cycle of life and death in ice, he adds.

A remaining big question, says geomicrobiologist Mark Skidmore of Montana State University in Bozeman, is how widespread is this methane cycling in ice. The finding is intriguing, he adds, because researchers don't know how much methane is being made and then eaten under other glaciers and ice sheets, he says, or even in other places around Greenland.

In Antarctica, the scenario could be very different, biogeochemist Martyn Tranter of the University of Bristol in England says. There, little oxygen-toting water gets through the ice, a key step in waking up methane-destroying bacteria. But as melting continues, he adds, it could ramp up.

For now, Tranter says, the "wow factor" is the discovery of the methane-gobbling bacteria. "If I could have made up a dataset," he says, "this is the one I would have made up."

Citations

M. Dieser et al. Molecular and biogeochemical evidence for methane cycling beneath the western margin of the Greenland Ice Sheet. *ISME Journal*. Published online April 17, 2014. doi:10.1038/ismej.2014.59.

Further Reading

A. Witze. Methane-making microbes thrive under the ice. *Science News*. Vol. 177, April 10, 2010, p. 15.