Mud volcano stews in chilly Arctic waters

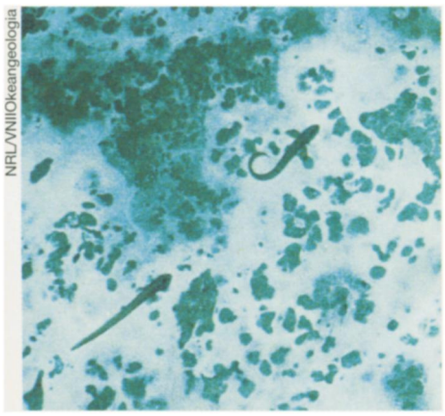
A team of U.S., Norwegian, and Russian scientists has found an unusual layer of snowlike natural gas draped across a warm mud volcano—the deep-sea equivalent of apple pie à la mode. Oceanographers have never before witnessed this contrast of an icy coating on top of a seething underwater volcano.

Researchers from the Naval Research Laboratory (NRL) in Washington, D.C., and their Norwegian colleagues discovered the 1,250-meter-deep mud volcano in 1995, while conducting a sonar study between Norway and the island of Spitsbergen. Unlike more familiar volcanoes, which eject rock and ash, mud volcanoes spew out a slurry of seafloor sediments mixed with water. The scientists named the 1-kilometer-wide circular feature the Håkon Mosby mud volcano, after the Norwegian research vessel used in the expedition.

Last year, the oceanographic team returned on a Russian ship with cameras and instruments to probe the seafloor. The scientists presented their findings last week at a meeting of the American Geophysical Union in Baltimore.

Pictures of the mud volcano show a white substance, believed to be methane hydrate, covering the seafloor like freshly fallen snow. Methane hydrate is a solid that forms when high pressures and low temperatures squeeze water molecules into a crystalline cage around a methane molecule. Cores drilled into the sediments beneath the surface of the mud volcano contained radish-size clumps of hydrates, which fizzled and evaporated quickly when brought to the ship.

Methane hydrates are capturing increasing attention, in part because they represent the largest untapped source of fossil fuels left on Earth (SN: 11/9/96, p. 298). Oceanographers suspect that methane hydrates hide in vast subseafloor deposits around the continents, but it is extremely rare to find the icy substance sitting on the ocean floor, says Peter R. Vogt of NRL, one of the scientists leading last year's expedition.



White methane hydrates coat an underwater mud volcano north of Norway.

Methane seeping up from the mud volcano supports a rich community of organisms, including a new species of tiny tube worms, report the Russian scientists on the team. Members of the animal phylum Pogonophora, tube worms have neither mouths nor digestive tracts. They get their energy from symbiotic bacteria, which live inside the worms and oxidize methane.

Mud volcanoes exist in many places around the world, but the Håkon Mosby is unusual, says Vogt. Unlike most other such volcanoes, which develop above rising blobs of salt or near ocean trenches, the Håkon Mosby has no clear geologic feature forcing the mud to erupt at the surface. The team of researchers is planning another expedition in 1998, during which they will dive to the volcano inside two Russian submersibles.

As ocean temperatures warm in the next century, shallow deposits of methane hydrates could melt and destabilize sediments on the continental slopes. If the seafloor gives way, massive submarine landslides would trigger giant waves that would inundate coastal communities.

"The consequences of hydrate decomposition in the not-too-distant future are going to be a problem for society," says Peter G. Brewer of the Monterey Bay Aquarium Research Institute in Moss Landing, Calif. Sites like the Håkon Mosby mud volcano allow scientists to study how hydrates form and decompose in their natural environment, he says. *—R. Monastersky*

Can houseflies spread the ulcer bacterium?

Ten years ago, the standard prescription for an ulcer would have been an antacid and a bland diet. Today, it's an antibiotic.

It took a long time for the notion that a microbe causes ulcers to catch on, and one of the reasons was the setting. The stomach was considered too acidic for anything to inhabit.

Researchers have now found another place where *Helicobacter pylori*, the ulcer-causing bacterium, can live—on the body and in the gut of houseflies. Although the flies did not acquire the microbe in a natural setting, the researchers say that the finding, reported in the June JOURNAL OF CLINICAL MICROBIOLOGY, raises the possibility that the insects can sometimes transmit the organism. If so, it may explain part of the intriguing epidemiology of *H. pylori* infections.

After working in Africa for a year, Peter Grübel, a gastroenterologist at St. Elizabeth's Medical Center in Boston, was prompted to look into the possibility that flies transmit the bacterium.

He wondered whether the constant presence of the insects might have something to do with the high rates of *H. pylori* infections in developing countries, where 60 to 70 percent of the population can be affected. In the United States, about 30 percent of the population shows signs of the infection.

There's also a generational difference in developed countries. *H. pylori* infections, including ulcers and some gastric cancers, are prevalent among older adults but rare among children. In developing countries, most children are infected by age 10.

How the infection spreads hasn't been clear, although scientists have generally thought that the bacterium travels the same fecal-oral route as salmonella and other pathogens that can be transmitted by flies.

Grübel and his colleagues set up an experiment to see whether *H. pylori* can indeed live on the housefly. They let disinfected flies feed on petri dishes covered with *H. pylori* and collected some of the insects every few hours to analyze.

The researchers were able to grow in the laboratory *H. pylori* from the flies' bristly outer surfaces, gut, and droppings. A portion of the fly's gut is as acidic as the human stomach. "*H. pylori* may find a very good niche in flies," says Grübel.

He and his coworkers are now beginning to develop a method for detecting the bacteria on flies taken from a natural setting. Grübel says flies could be involved in spreading the infection in areas with poor sanitation. The insects may also have contributed to the prevalence of *H. pylori* in people born before indoor plumbing became standard in postwar European and U.S. households, he says.

"It is a provocative theory," says Barry J. Marshall of the University of Virginia Medical School in Charlottesville, who helped make the connection between the bacterium and ulcers in 1983.

Flies probably aren't the final answer to the question of ulcer transmission, says microbiologist Martin J. Blaser of Vanderbilt University Medical Center in Nashville. "Smart organisms like *Helicobacter* have figured out a lot of different ways to get transmitted," as has HIV, he says. "I don't think transmission relies on one route."

Hand washing, or the lack thereof, very likely plays a key role in the spread of *H. pylori*, he adds. *—C. Mlot*