



When researchers split open the log, they found tiny tunnels full of shipworms.

MARINE RESEARCH

Arctic shipworm discovery alarms archaeologists

Sunken log full of tunneling mollusks poses mystery

By **Eli Kintisch**, aboard the RV Helmer Hansson off Svalbard, Norway

Marine scientists made a surprise catch last month while trawling for sea creatures in the icy depths of Rijpfjorden, a remote bay in this Arctic archipelago: a log the size of a battering ram. Steel chains hauled the tree trunk up from the sea floor 250 meters below, startling crew and scientists alike. “In 15 years of coming here I’ve never seen such a big piece of wood from a bottom trawl,” said marine biologist Jørgen Berge of the University of Tromsø (UT) in Norway, the cruise leader. Then, an even bigger surprise: The 7-meter log was infested with living shipworms, white and gooey.

The researchers were astonished because shipworms—mollusks adapted to tunnel into and eat wood—had never been documented so far north, just 1100 kilometers from the North Pole, and at such a depth, where the temperature was -1.8°C . Were the borers a southerly species that had moved north with warming seas, or a previously undescribed Arctic native? Either way, “this is a fantastic discovery, something we never would have dreamed of,” Berge said.

For another team member, marine archaeologist Øyvind Ødegård of the Norwegian University of Science and Technology, Trondheim, the sight of the 6-centimeter-long creatures was more akin to a nightmare. Historical records suggest more than 1000 shipwrecks dot the coasts around Svalbard, harboring centuries of secrets.

Ødegård expected them to be safe from borers. “I believed because of the low temperatures we wouldn’t find shipworms,” he said. Now, he worries that they could devour the wrecks before scientists find them. Arctic shipworms would be “a disaster” for archaeologists, Berge predicts.

Mariners have cursed species in the genus *Teredo* since wooden ships first set sail. Individuals grow to a meter long, riddling hulls, piers, and other wood structures with undulating tunnels. Shipworms devoured three of Christopher Columbus’s ships in 1503, during his fourth voyage to the Americas, marooning the crews. Today, the mollusks cause an estimated \$1 billion in damages annually, and have consumed wrecks from the tropics to southern Sweden.

As the oceans have warmed in recent decades, scientists have noticed the borers moving to higher latitudes. A few years ago, they infested a wooden dock at Longyear-



The burrowing mollusk’s heads resemble drillbits.

byen, Svalbard’s biggest town, says UT chemist Bjørn Altermark. To gauge shipworm abundance, in 2014 he placed a sample of spruce on a mooring near shore; a year later it had been attacked by a single borer. Researchers speculated that Atlantic currents might have swept shipworm larvae up from the south, or ships discharging ballast water might have released them.

Intrigued, Ødegård, the archaeologist, ran an experiment to determine their range. Last year, he and Berge placed oak planks in a nearby fjord that also receives Atlantic water, as well as in the distant Rijpfjorden, which is fed by the colder Arctic Ocean to the north. The Rijpfjorden samples were “meant to be a control,” Ødegård recalls. He didn’t expect to see shipworms in the frigid bay, and hadn’t yet retrieved the planks when the log surfaced. “Astonishing,” he says.

Scientists are now debating how the Rijpfjorden mollusks—not yet definitively identified—could thrive. Studies suggest that the most common shipworm species, *T. navalis*, cannot reproduce at temperatures below 10°C . So one scenario is that the log became infested in warmer waters to the south or east of Svalbard, then recently drifted into the fjord and sank.

But several factors hint at a second possibility: that researchers have discovered a new species or variant able to thrive near the freezing point of saltwater. Ample black sediments inside the log, as well as stringy marine organisms growing on its side, suggest it may have been on the sea floor for a year or more. And when researchers sliced open the wood, they found worms in many stages of development—including young “fresh worms,” as Berge calls them—which suggested the community had been around a while. (Svalbard is treeless, but there is plenty of driftwood for shipworms to infest.)

“I’m depressed either way,” Ødegård says. He takes some solace, however, from what he saw at a wreck that the *Helmer Hansson* visited just a few days after the log’s discovery. The wooden whaler *Figaro* sank near Longyearbyen in 1908. Despite more than a century in the sea, however, digital pictures showed just minor traces of shipworm damage. Still, Ødegård worries that the hulk “is not going to do very well” over the next century if shipworms become more common in the Arctic.

More clues to the origins of the Rijpfjorden shipworms are expected soon. On the last day of the cruise, a researcher used a chainsaw to cut slices from the log. They’ve been distributed to scientists, including some who are using genetic markers to figure out whether the mollusks are something new to science—or just a familiar face in an unusual place. ■