

# Pacific shellfish ready to invade Atlantic

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As the Arctic Ocean warms this century, shellfish, snails and other animals from the Pacific Ocean will resume an invasion of the northern Atlantic that was interrupted by cooling conditions three million years ago, predict Geerat Vermeij, professor of geology at the University of California, Davis, and Peter Roopnarine at the California Academy of Sciences.

Climate models predict a nearly ice-free Arctic Ocean by 2050. That will restore conditions that last existed during the mid-Pliocene era around three to 3.5 million years ago. Several north Pacific species have relatives in the north Atlantic, and the fossil record shows a lot of invasion from the Pacific to the Atlantic at that time, Vermeij said.

When cold conditions returned, the Arctic route was cut off, mostly by a lack of food. As the ice melts, productivity in the Arctic will rise and the northward march of the mollusks will resume where it left off three million years ago.

Vermeij and Roopnarine reviewed literature on mollusks found in the Bering and Chuckchi seas between Alaska and eastern Siberia. At least 77 molluscan lineages, about a third of the species of shallow-water shellfish in the Bering Sea, have the potential to spread to the Atlantic, they concluded.

Three factors drove the one-way traffic across the North Pole during the Pliocene, Vermeij said. The Bering and Chukchi seas are very productive, with abundant food; there is a net northward flow of water

from the Pacific through the Bering Strait; and strong competition in the Bering Sea means bigger, tougher animals.

But the invaders will not wipe out native species, Vermeij said. The fossil record shows that invasions rarely lead to species extinction in marine environments, he said. Instead, the invasion will add new species and hybrids and increase competition in the North Atlantic.

"The composition and dynamics of north Atlantic communities will change," Roopnarine said. "But whether that will help or harm local fisheries is an open question. Humans may have to adapt as well."

In the paper, Vermeij and Roopnarine note that in the past, species expanded their ranges within and between oceans during warm periods.

"The interesting thing to me is that the fossil record has something to say about the consequences of global warming," Vermeij said.

The article is published in the Aug. 8 issue of the journal *Science*.

Source: University of California - Davis

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