

## Blue mussels recolonized the Arctic by hitching rides on plastic debris

By [Zack Fishman](#)  
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A plastic barrel carrying blue mussels and smooth gooseneck barnacles washed ashore at the Svalbard archipelago in northern Norway. (Lech Kotwicki)

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Blue mussels were recently found in the Arctic Circle for the first time in a millennium, and a new analysis of field observations and genetic samples suggests that at least some of them arrived so far north by riding barrels and other plastic through the ocean.

The study, published May 4 in *Global and Planetary Change*, highlights how human activity and its products are influencing the region's ecosystems. The spread of the [blue mussel](#) represents a larger shift of potentially invasive species whose habitats are creeping northward because of Arctic warming and other consequences of climate change.

The Arctic has [been warming](#) more rapidly than the rest of the world as a result of humans emitting heat-trapping greenhouse gases. Animals have [been expanding](#) into the region as temperatures rise, with species such as grizzly bears, coyotes, and humpback and killer whales making increasingly frequent appearances north of the Arctic Circle.

The same has been true at the Svalbard archipelago, a collection of Norwegian islands nearly as close to the North Pole as to the top of Greenland. There, marine ecologist Lech Kotwicki has studied the creatures and environment of the surrounding Arctic areas for 30 years, and he has seen a rising influx of large [plastic debris](#) covered with vegetation or attached animals.

"On the one hand, there are new species that are considered 'warm water' [around the Svalbard archipelago]," said Kotwicki, a senior researcher at the Institute of Oceanology of the Polish Academy of Sciences and the new paper's lead author. "On the other hand, there is a lot of garbage, which, in this area considered to be pristine, is at least a sad sight."

One of the creatures observed on the plastic debris is the blue mussel, a common species of bivalve mollusk that is widespread in both hemispheres but is limited in its habitat by cold air temperatures. Blue mussels were abundant in the area between 7,000 and 9,000 years ago, when the Arctic was much warmer than in recent preindustrial times, and the most recent trace of the creatures are partially fossilized remains from about 1,000 years ago.

Blue mussels were first discovered in modern-day Svalbard in 2004, and Lotwicki and his co-authors investigated how they traveled from as far as [the Mediterranean](#). The team collected samples in Svalbard and the Faroe Islands, a Danish archipelago north of the U.K., and compared the mussels' genetics with those of mussels living off of North American and European coasts.

Genetic comparisons showed that many of the Svalbard blue mussels shared genes with mussel populations from Western Europe, the Faroe Islands, Scotland and Norway, making those locations the likely origins of the recolonizers.

The researchers also found between "a few and several dozen pieces" of plastic [on the coastline](#) of sample sites every 100 meters, and they reported that most of the largest objects had creatures such as mussels, barnacles and bryozoans — also known as moss animals — stuck to them. The researchers said it is unlikely that blue mussels reached Svalbard using sea currents alone, and travel via oceanic plastic pollution "is considered in this work as the main cause of the reappearance" of the mussels.

Other vessels possibly available to the mussel include driftwood, ship hulls and birds, according to the researchers, although they said there is relatively little research on how species move across oceans to colonize new environments.

"Drift on wood or algae has always been a natural way of transport, but recently there has been a [rapid increase](#) in the amount of plastic — which can also serve as a surface for rafting — entering the oceans," Kotwicki said.

The reemergence of blue mussels in Svalbard will not damage the ecosystem, Kotwicki said. Instead, the species is often used by scientists as a bioindicator to track changes in climate, because conditions such as low winter air temperature limit their spread.

Mussels aren't the only new species the marine ecologist has spotted on the archipelago; others include mosquitoes, and a cod caught while fishing. Furthermore, a recent study found [36 invasive plant species](#) in Svalbard, located in areas of human activity and likely introduced, in part, by tourists. That study's authors said it is important to monitor the plants for threats to local biodiversity.

Invasive species have also caught the attention of the eight countries with territories in the Arctic Circle. In 2017, these nations agreed to take efforts to protect the region from the negative effects of invasive species by adopting the [Arctic Invasive Alien Species Strategy and Action Plan](#).

"The Arctic is the region where climate change is observed fastest, and the results shed light on other regions of our globe," Kotwicki said. "The expansion of new species, their reappearance, their sources, dispersal possibilities, and contaminants are all topics that we will continue to pursue."

*The study, "The re-appearance of the Mytilus spp. complex in Svalbard, Arctic, during the Holocene: The case for an arrival by anthropogenic flotsam," published May 4 in Global and Planetary Change, was authored by L. Kotwicki, J.M. Węśławski, M. Włodarska-Kowalczyk, M. Mazurkiewicz, R. Wenne and M. Zbawicka, Institute of Oceanology Polish Academy of Sciences; D. Minchin, Klaipeda University Marine Research Institute and Marine Organism Investigations; and S. Olenin, Klaipeda University Marine Research Institute.*

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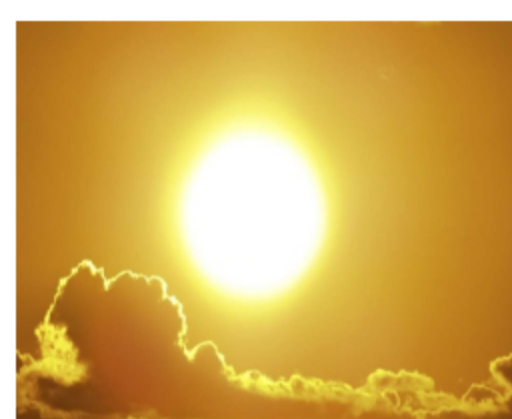
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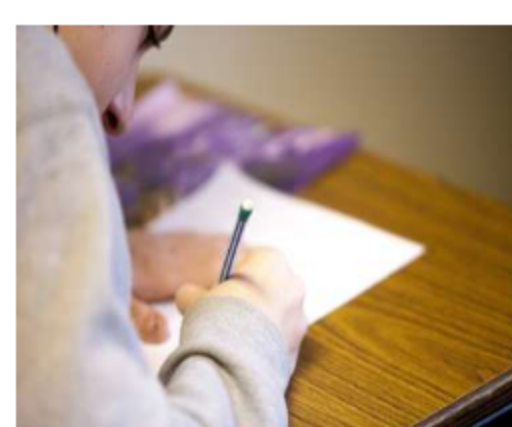
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