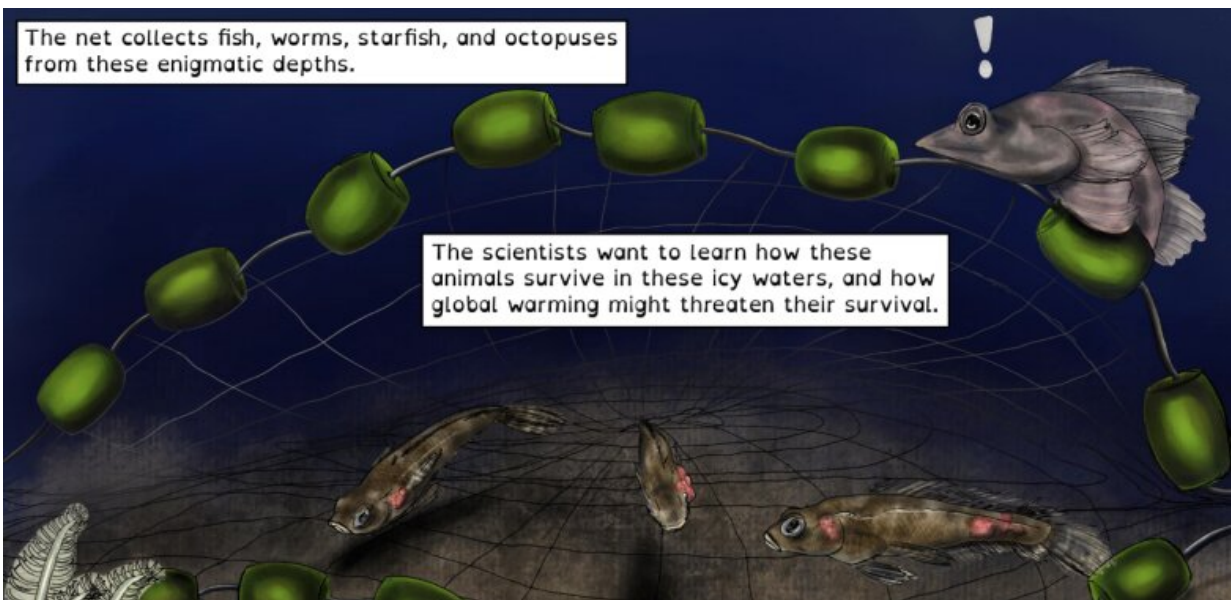


Climate change may be culprit in Antarctic fish disease outbreak

June 29 2022, by Laurel Hamers



Credit: University of Oregon

Climate change might be behind an unusual disease outbreak among Antarctic fish.

For about a decade, UO biologists John Postlethwait and Thomas Desvignes have been visiting the West Antarctic Peninsula. They study a unique group of fish that has adapted to the harsh polar environment. But on a 2018 field excursion, they noticed something especially strange:

a large number of those fish were afflicted with grotesque skin tumors.

Collaborating with virologists and pathologists, they determined the tumors were the result of a parasitic illness, an unprecedented [outbreak](#) on a scale never seen before near Antarctica. Waters and melting ice might have contributed to the outbreak in this particularly vulnerable ecosystem, the team reports in June in the journal *iScience*.

"When life conditions become challenging, animals become more prone to disease," said Thomas Desvignes, chief scientist during the [research expedition](#) and lead author on the study.

The researchers also worked with UO undergraduate Chloe DaMommio to create a short, free, online graphic novel about the research.

Most fish that swim through the [frigid waters](#) near Antarctica are part of a group called notothenioids. Notothenioids have evolved many unique adaptations to their icy environment, including specialized proteins that prevent their blood from freezing. On their research expeditions, Postlethwait's team captures and studies many species of notothenioids to understand more about those evolutionary adaptations.

During their 2018 field season, they visited a small fjord on the West Antarctic Peninsula that's usually filled with ice at that time of year. Finding it clear, they ventured in and began fishing.

"As soon as we got the first trawl back on deck, we realized that one species was really abundant, and a lot of them had big tumors," Desvignes said. "When we saw that, we immediately realized we had to do something."

"Very little is known about diseases associated with these animals" said Arvind Varsani, an Arizona State University virologist who specializes in

Antarctic animals and a co-author on the study.

Desvignes and his collaborators collected samples from both diseased and healthy fish and brought them back to Eugene. Despite years of fishing around Antarctica, the researchers hadn't seen disease on that scale. Neither had many other Antarctic fish biologists familiar with the area.

Back in the lab, they analyzed the tumors. The ultimate diagnosis: X-cell disease, a poorly understood parasitic illness. It's been reported sporadically in wild fisheries in Iceland and Norway, but scientists still don't fully know how it's transmitted.

Further analyses suggested that the parasites causing the tumors belonged to a different genus than other parasites implicated in previous X-cell disease cases.

It can be difficult to pin a disease outbreak on a specific cause. But Antarctic ecosystems are particularly vulnerable to the effects of [climate change](#) and are seeing especially rapid changes.

As ice melts, for example, the nearby water becomes less salty. And the bottom water where these notothenioids live is becoming warmer and fresher especially fast.

Warming waters and shifting ecosystems could be putting pressure on the [fish](#), making them more vulnerable to disease, Desvignes suggests. Climate change could also affect the parasite's life cycle, perhaps making it more effective at spreading and infecting.

Other nonclimate-related explanations could explain the outbreak, too, but the team needs more data to draw firmer conclusions.

"Maybe the parasite has a long life cycle and only manifests into a [disease](#) outbreak every so often, and we might have been there by chance when that was happening," Desvignes said.

Due to COVID-19 and the challenging logistics of visiting Antarctica, they haven't been able to return to the area since then.

"We're preparing project proposals to go there again and study this specific outbreak, how it evolved since 2018, and explore adjacent areas to try to see whether we can detect the pathogen elsewhere and in other species," Desvignes said.

More information: Thomas Desvignes et al, A parasite outbreak in notothenioid fish in an Antarctic fjord, *iScience* (2022). [DOI: 10.1016/j.isci.2022.104588](#)

Graphic novel: blogs.uoregon.edu/antarcticxcell/

Provided by University of Oregon

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