

# Global warming threatens Antarctic sea life

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Climate change is about to cause a major upheaval in the shallow marine waters of Antarctica. Predatory crabs are poised to return to warming Antarctic waters and disrupt the primeval marine communities.

"Nowhere else than in these ecosystems do giant sea spiders and marine pillbugs share the ocean bottom with fish that have antifreeze proteins in their blood," says Rich Aronson, professor of biological sciences at Florida Institute of Technology in Melbourne, Fla. "The shell-cracking crabs, fish, sharks and rays that dominate bottom communities in temperate and tropical zones have been shut out of Antarctica for millions of years because it is simply too cold for them."

But this situation is about to change. "Populations of predatory king crabs are already living in deeper, slightly warmer water," says Aronson. "And increasing ship traffic is introducing exotic crab invaders. When ships dump their ballast water in the Antarctic seas, marine larvae from as far away as the Arctic are injected into the system."

Aronson and his colleagues published their results in the electronic journal *PLoS ONE* to coincide with the U.S. National Teach-In on Global Warming Solutions on Feb. 5.

Fast-moving, shell-crushing predators, dominant in most places, cannot operate in the icy waters of Antarctica. The only fish there—the ones with the antifreeze proteins—eat small, shrimp-like crustaceans and other soft foods. The main bottom dwelling predators are slow-moving sea stars and giant, floppy ribbon worms.

To understand their history, Aronson and a team of paleontologists collected marine fossils at Seymour Island off the Antarctic Peninsula. Linda Ivany of Syracuse University reconstructed changes in the Antarctic climate from chemical signals preserved in ancient clamshells. As temperatures dropped about 41 million years ago and crabs and fish were frozen out, the slow-moving predators that remained could not keep up with their prey. Snails, once out of danger, gradually lost the spines and other shell armor they had evolved against crushing predators.

Antarctica's coastal waters are warming rapidly. Temperatures at the sea surface off the western Antarctic Peninsula went up 1°C in the last 50 years, making it one of the fastest-warming regions of the World Ocean.

If the crab invasion succeeds, it will devastate Antarctica's spectacular fauna and fundamentally alter its ecological relationships. "That would be a tragic loss for biodiversity in one of the last truly wild places on earth," says Aronson. "Unless we can get control of ship traffic and greenhouse-gas emissions, climate change will ruin marine communities in Antarctica and make the world a sadder, duller place."

Source: Florida Institute of Technology

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