

With climate changes, polar bear and brown bear lineages intertwine

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Polar bears' unique characteristics allow them to survive in one of the most extreme environments on Earth, but that survival is now threatened as rising temperatures and melting ice reshape the Arctic landscape. Now it appears that the stress of climate change, occurring both long ago and today, may be responsible for surprising twists in the bears' history and future as well.

According to [DNA evidence](#) reported in the July 7th [Current Biology](#), a Cell Press publication, polar bears and brown bears have mated successfully many times in the last 100,000 years. As a result of some of those pairings, the polar bears of today also have unexpected Irish roots.

"We found that brown bears and polar bears, which are hybridizing today in the wild, have been hybridizing opportunistically throughout the last 100,000 years and probably longer," said Beth Shapiro of The Pennsylvania State University, noting recent sightings of hybrid adults in Canada. "Generally, this seems to happen when climate changes force the bears to move into each others' habitat. When they come into contact, there seems to be little barrier to them mating."

The researchers used patterns in [mitochondrial DNA](#) sequence to trace the bears' evolutionary history. Mitochondria are [cellular components](#) with their own DNA and are passed on from mother to child. By extracting and sequencing those mitochondrial genomes from fossils collected from all over the world, the researchers were able to observe how the bears' maternal lineages have shifted in space and over time.

They then correlated those patterns with changes in the environment and in the bears' habitats.

"This approach provides a means to go back in time and directly measure the movement of species in response to past [climate change](#)," said study author Daniel Bradley of Trinity College Dublin.

The study shows that the modern polar bears' maternal line (from female ancestor to their descendants of either sex) descends from a recent hybridization with an extinct population of brown bears that lived in the vicinity of modern-day Britain and Ireland, not from bears living off the coast of Alaska as many believed. That hybridization event most likely occurred just prior to or during the last ice age, they report.

They say that future conservation strategies can benefit from the new understanding of bears' evolutionary history. But that's not to say that their status should change based on the findings.

"There is no reason that past hybridization and genetic introgression with brown bears should affect at all the conservation status of polar bears," Shapiro said. "The two species are very different, each adapted to a particular lifestyle, and each playing a crucial role in their ecosystem."

In light of the new evidence, it may be prudent to afford protection to brown/polar bear hybrids, including those recently sighted in Canada.

"While vulnerable populations of both bear species are currently protected, the protection status of hybrids is less clear, with a 1996 proposed U.S. policy to protect hybrids yet to be finalized," the researchers write. "Although the extent of any fitness differential between hybrid brown/polar bears and their parents remains unclear, given the increasing evidence of hybridization among many threatened arctic taxa, it may be appropriate to reconsider protection of hybrids as

they may play an underappreciated role in the survival of species."

Provided by Cell Press

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