



FROZEN HOMES HOW DO POLAR ANIMALS DEAL?

Life at the Earth's poles is brutally cold. Yet animals still make their homes there. How do they survive?

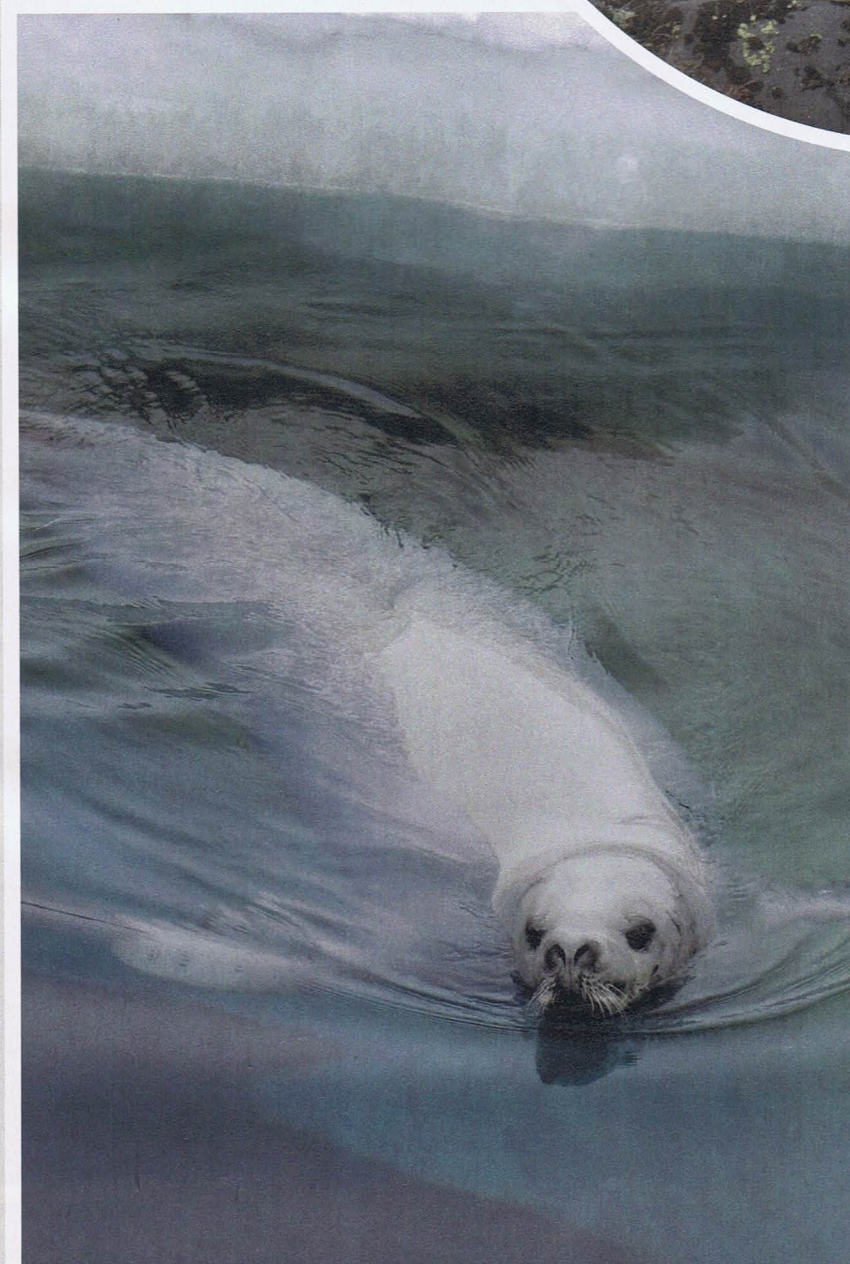
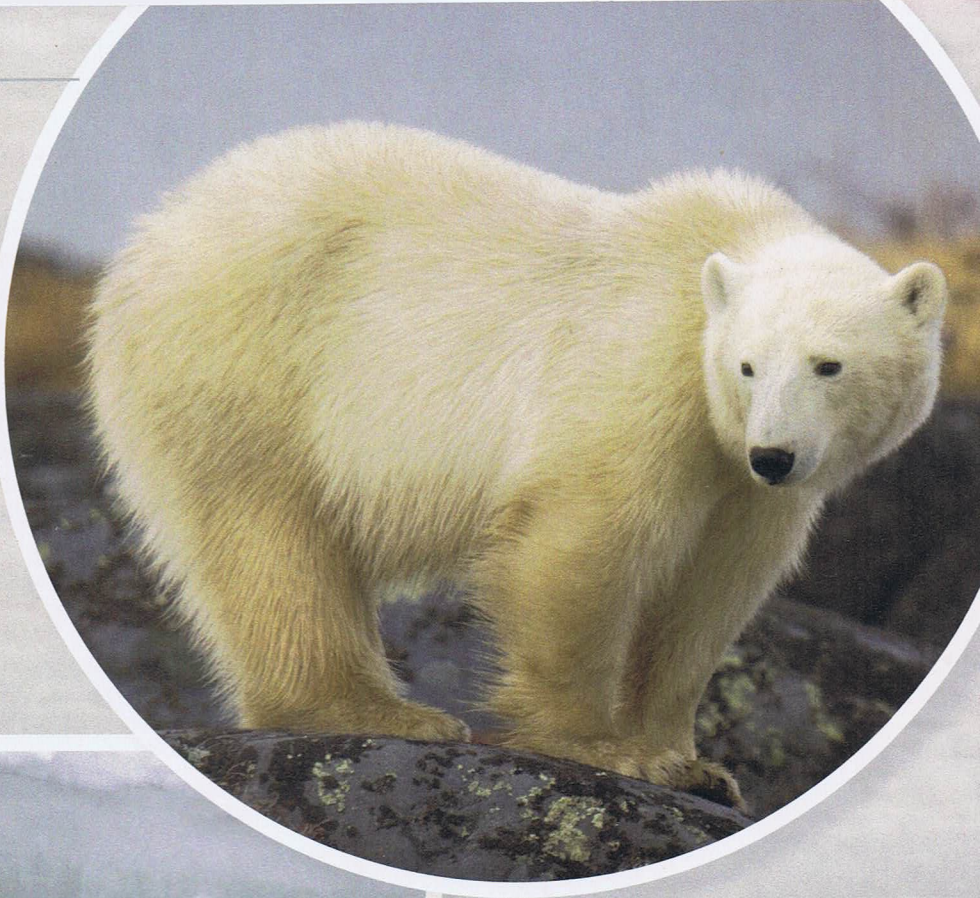
"For us, really cold temperatures and ice and snow present challenging conditions, but for the animals that live there that's exactly what they have evolved to live in," says Elisabeth Kruger, senior program officer for arctic wildlife at the World Wildlife Fund.

Animals that don't migrate to warmer regions or sleep the coldest months away find other ways to deal with harsh weather. Read on to see what adaptations have enabled animals to thrive in the coldest environments on Earth.

POLAR BEARS WEAR DOUBLE-DUTY FUR COATS

Polar bears are doubly protected from the cold by two layers of fur. A dense undercoat keeps them warm while an oily, water-repellent layer of guard hairs keeps them dry—and anyone who has ever been cold *and* wet knows that it's worse than just being cold.

Their long fur also creates a layer of trapped air as another form of insulation from the frosty surroundings.



NO BLUBBERING FOR SEALS

Seals in polar waters possess a thick layer of fat under their skin, called blubber. Blubber provides insulation, allowing seals to swim in water as cold as 28.4° F (-2° C). Seals' bodies can reduce blood flow to blubber, holding most of their blood deep inside. This keeps the blood warmer than if it was near the skin surface, where it could lose heat to the cold air outside.

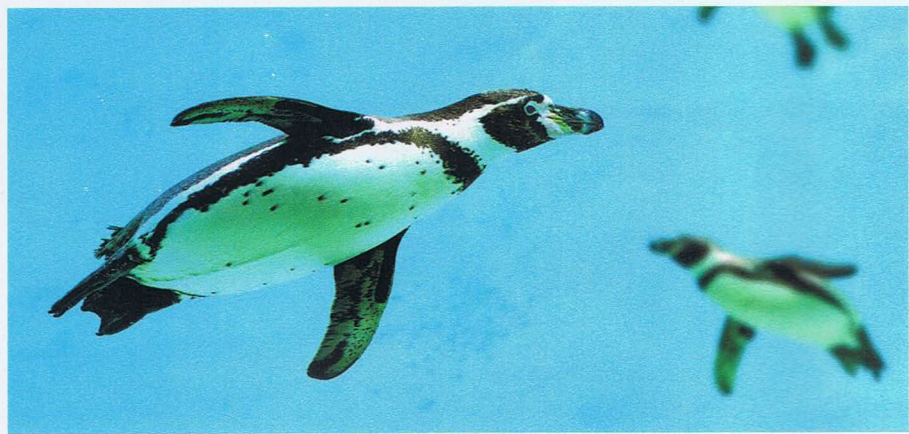
"Fat is one of the best things you can have to stay warm in a cold climate," says Kruger. "Fat is also a place to store energy, like a pantry or refrigerator."



PENGUINS GET COLD FEET

Like seals, whales, and other warm-blooded animals with flippers and flukes, penguins conserve heat by keeping their extremities cold.

Penguins' feet and flippers are not well insulated, but they are equipped with many blood vessels. Arteries carrying warm blood away from the heart sit directly against the veins carrying cool blood to the heart. So on the way to the feet or flippers, warm blood cools down. And on the way back, the cool blood warms up. With this adaptation, penguins keep heat in their core and lower the amount of heat that escapes through their chilly feet and flippers.



FISH HAVE ANTIFREEZE IN THEIR BLOOD

In the frigid Southern Ocean, most fish would turn into fish popsicles. Ice crystals would form in their blood, growing and spreading until the animal freezes solid. But certain species, like the Antarctic toothfish, have evolved a way to avoid this fate. They have special proteins in their blood that bind to ice crystals and prevent them from growing and spreading throughout the fish's tissues. Some of these fish completely lack oxygen-carrying red blood cells. Instead, they have thin, clear blood that doesn't thicken in freezing temperatures.





ARCTIC FOXES KEEP FEATURES PETIT

Small extremities—any body part removed from the main trunk—help prevent heat loss. The Arctic fox has a stocky body and shorter ears, muzzle, legs, and tail than foxes that live in more temperate climates. Smaller appendages help decrease the ratio of an animal's surface area (or its outsides) to its volume (or insides). As this ratio goes down, so does the rate at which heat escapes. Extremities that are close to the body stay warmer and resist frostbite better than large ones.

ARCTIC HARES HUDDLE WITH BUDDIES

Not all adaptations are physical. Arctic hares live in the North American tundra. During the coldest weather, Arctic hares huddle together in groups that may number in the hundreds for both warmth and protection. Huddling is a good way to retain heat and create some shelter from the wind.



Mary Bates is a freelance science writer based near Boston, which gets cold enough for her. She likes to write about the brains and behavior of humans and other animals.