

Adaptation

- Adaptations are the way living organisms cope with environmental stresses and pressures
- A biological **adaptation** is an anatomical structure, physiological process or behavioral trait of an organism that has evolved over a period of time by the process of natural selection such that it increases the expected long-term reproductive success of the organism

Adaptation con't

Organisms that are adapted to their environment are able to:

- get air, water, food and nutrients
- cope with physical conditions such as temperature, light and heat
- defend themselves from their natural enemies
- reproduce
- respond to changes around them

- Habitats provide food, water, and shelter which animals need to survive.
- Animals also depend on their physical features to help them obtain food, keep safe, build homes, withstand weather, and attract mates.
- These physical features are called called physical adaptations.



- Physical adaptations do not develop during an animal's life but over many generations.
- The shape of a bird's beak, the number of fingers, color of the fur, the thickness or thinness of the fur, the shape of the nose or ears are all examples of physical adaptations.

Polar Bears

Special adaptations



1. Why do polar bears have such big feet?
 2. How does their fur keep them warm?
- Polar bears live year round near arctic waters hunting seal and other animals, rarely coming on land except on islands and rocky points. In winter they hunt along the Arctic shelves looking for tasty seals, fish, and even humans! Their white coats provide camouflage in the ice and snow which make them almost invisible as they stalk their prey.



Polar bears have longer legs than other bears and large furry feet. These big feet help to distribute their weight as they walk on thin ice in the arctic waters.

- Polar bears are strong swimmers and can stay submerged for two minutes at a time.
- Their fur is made of hollow hairs which trap air and help to insulate them in the frigid waters.

ANCHORAGE, Alaska (AP) -- Three environmental groups sued the federal government Thursday, seeking to protect polar bears from extinction because of disappearing Arctic sea ice.

The lawsuit, filed in federal court in San Francisco, demands that the government take action on a petition environmentalists filed earlier to have polar bears listed as "threatened" under the Endangered Species Act.

Once a species is listed as threatened, the government is barred from doing anything to jeopardize the animal's existence or its habitat. In the case of the polar bear, the environmentalists hope to force the government to curb U.S. emissions of greenhouse gases such as carbon dioxide.

The Center for Biological Diversity, the Natural Resources Defense Council and Greenpeace said extensive scientific evidence shows sea ice is melting because of global warming.

"Global warming and rising temperatures in the Arctic jeopardize the polar bear's very existence," said Melanie Duchin of Greenpeace.

"Polar bears cannot survive without sea ice. Polar bears could disappear in our lifetime if we don't take action."

Valerie Fellows, a Fish and Wildlife Service spokeswoman in Washington, said she did not have the lawsuit in front of her and could not comment on its specifics.

America's polar bears are found in Alaska. The Beaufort Sea stock off Alaska's northern coast is estimated at 2,000 animals. The Bering-Chukchi stock off Alaska's northwest coast, a population shared with Russia, is estimated at 2,000 to 5,000.

There is no firm count of polar bears, and the lawsuit did not indicate how many may have been lost because of retreating ice. In September, the University of Colorado's National Snow and Ice Data Center, NASA and the University of Washington announced a "stunning reduction in Arctic sea ice at the end of the northern summer."

Tundra Adaptations

- Biologists have noticed that many tundra birds and mammals are larger and have smaller appendages than do similar species living in warmer environments.



- Tundra hares, for example, are among the largest hares and have shorter ears and legs than do desert hares (called jackrabbits).
- Similarly, arctic foxes have shorter ears than do desert kit foxes.
- Even lemmings are larger and have smaller ears and tails than do most other mouse-like animals. Large size and short appendages are adaptations that reduce heat loss and resist the cold.

- The amount of heat loss increases as the proportion of exposed surface area to body mass increases. Since that proportion is greater in small animals, they lose heat more quickly.
- An animal with long legs, ears, or a tail has more surface area than an animal of the same size that has shorter appendages

Boreal Forest



The boreal or "northern" forest is Canada's largest biome or environmental community. It occupies 35% of the total Canadian land area and 77% of Canada's total forest land, stretching between northern tundra and southern grassland and mixed hardwood trees.



- The slender, conical shapes of many boreal forest trees help them to shed snow.
- Most boreal forest trees have relatively shallow root systems, taking advantage of the thin layer of unfrozen soil. Black spruce trees can grow in soil only 20 inches deep!



Black spruce and white spruce extend their own growing seasons by retaining their waxy, drought- and frost-resistant needles year-round; thus they can photosynthesize later in autumn and earlier in spring than deciduous species.

These conifers are very frugal trees. They retain their photosynthesis equipment -- needles -- through the winter, so they do not have to expend energy growing a full set of leaves every spring.

Desert Plant Adaptation

- The desert plants have had to develop extraordinary ways to survive in the harsh and unforgiving environment.
- For instance, the cacti and other plants have wax-like coatings on their green stems or leaves to slow evaporation and save water.
- Grasses have dense, shallow root systems that intercept water as soon as a rain falls.



- The desert shrubs may have small leaves to slow evaporation and save water, and they may have root systems that reach deep for underground moisture.
- Some desert plants produce hard-coated seeds that might lie in dry soil for years, waiting for the right combination of conditions necessary for them to sprout.

Desert Animal Adaptations

- Avoiding Heat - Many animals (especially mammals and reptiles) are crepuscular, that is, they are active only at dusk and again at dawn. For this reason, humans seldom encounter rattlesnakes and Gila Monsters. Many animals are completely nocturnal, restricting all their activities to the cooler temperatures of the night.
- Dissipating Heat - The enormous ears of jackrabbits, with their many blood vessels, release heat when the animal is resting in a cool, shady location.



- Retaining Water - Some retain water by burrowing into moist soil during the dry daylight hours (all desert toads). Some predatory and scavenging animals can obtain their entire moisture needs from the food they eat
- Acquiring Water - Certain desert mammals, such as Kangaroo Rats, live in underground dens which they seal off to block out midday heat and to recycle the moisture from their own breathing. They also have specialized kidneys with extra microscopic tubules to extract most of the water from their urine and return it to the blood stream .