

ANIMAL ADAPTATION TOUR

Program Description. Theme: Animals have a variety of adaptations that help them survive.

A variety of physical structures and behaviors will be discussed to gain a better understanding of how animals are equipped with specific and unique adaptations that increase their ability to obtain food, protect themselves, and survive in their habitat. Because of individual and species differences, some animals will be more successful than others.

Physical adaptations may include external and internal body parts, and sensory capabilities. Behavioral adaptations are often linked to particular physical adaptations.

Objectives

What adaptations do animals have that enable them to survive and grow in their habitat?

Audience will -

- understand the concept of animal adaptations and how those adaptations give them a better chance of surviving in the wild
- differentiate between physical and behavioral adaptations and understand that animals typically have adaptive behaviors that correspond to each physical adaptation
- should understand that by observing physical adaptations of a species we can often predict/deduce many of their behaviors and habitat use
- understand that some adaptations have a cost to offset its benefit, for example, a turtle shell provides protection but it prevents rapid action

Key Concepts

Animal Adaptations

Animals possess a variety of adaptations that help them obtain food, protect themselves, and survive in their environment.

A physical adaptation is a body feature that is used as a “tool” that helps an animal survive. **A behavioral adaptation is something an animal does** to help it survive. Among the physical adaptations are the following:

- External – Eye/ear placement; teeth; beak; whiskers; feet; claws; outer covering, e.g., fur (including its thickness), feathers, scales, shell, armor, slime; camouflage; prehensile parts; size of animal; long tail
- Internal – Warm vs. cold blooded, hollow vs. solid bones, lungs vs. gills, ruminant stomach
- Sensory capabilities – Five senses, Jacobson’s organ

Among the behavioral adaptations are the following:

Being part of a group, e.g., pack hunting, safety in numbers, cooperative parenting; nocturnal vs. diurnal; predator vs. prey; carnivore, herbivore, omnivore; generalist vs. specialist; hibernates, migrates, or stays put in winter; communicates, scent marks; runs; jumps; digs, caches food; ruminates.

Differences in Ability to Adapt

Animals live in certain habitats because of their diet, physical needs, and/or ability to cope with weather conditions. Some individuals of the same species and/or species survive better than others due to differences in their senses, hunting ability, quickness, etc.

Adaptations to changes in the environment develop over many generations. Human actions now cause changes in the environment at a much faster pace than most animals can adapt.

Key Terms: physical adaptations, behavioral adaptations, behavior, tools, habitat, instinct, learned, camouflage, prehensile, eye/ear location

Term	Definition
Adaptation	A characteristic that has developed over generations that helps an animal to survive in its habitat
Characteristic	A special feature of an animal, e.g., a body part, special ability, or behavior
Tool	A special feature of an animal that is used to carry out a particular function
Habitat	The area where an animal lives and finds the food, water, shelter, and space that it needs
Behavior	The way an animal responds to a certain situation or stimulus
Innate behavior	Action that is “hardwired” from birth without any prior experience or training
Learned behavior	Action that an animal discovers through trial, error, and observation
Survive	To stay alive
Physical adaptation	A body feature (that is used as a tool”) developed over many lifetimes that helps animal to survive in its habitat
Behavioral adaptation	Something an animal does to help it to survive in its habitat
Predator	An animal that kills and eats other animals, a hunter
Prey	An animal that is eaten by a predator, an animal that is hunted
Camouflage	Color and/or patterns on the outside of an animal that help an animal to blend in with its surroundings
Eye/ear location	The position of an animal’s eyes and ears on its head, i.e., forward facing or side facing
Prehensile	A body part that grasps, such as the tail, lips, or tongue

Talon	A sharp claw of a bird of prey
Jacobson's organ	A body part inside the mouth of some mammals, reptiles, and amphibians. It helps the animal make sense of smells it gathers with its tongue.
Nocturnal	An animal that is most active at night
Diurnal	An animal that is most active during the day
Crepuscular	An animal that is most active at dawn and dusk
Warm blooded	An animal whose body temperature stays about the same no matter what the temperature of the surrounding air, land, or water is (mammals and birds)
Cold blooded	An animal whose body temperature changes with the temperature of the surrounding air, land, or water (reptiles, amphibians, fish)
Hibernate	When an animal spends the cold winter sleeping
Migrate	When an animal moves from one area to another during the winter to find food and returns to its home area in the summer
Cache	To hide food
Ruminant	A plant-eating, hoofed mammal whose stomach allows it to bring swallowed food back up into its mouth for more chewing
Cud	The food that a ruminant swallows and brings back up from its stomach into its mouth to chew again
Exoskeleton	A hard covering that protects the bodies of many animals without backbones, e.g., insects

Getting Started/Reminders

Selecting Content

An Adaptations program will include content that is part of other Potter Park Zoo programs, e.g., Fur, Feathers, Scales, and Slime; Sensational Zoo; What's for Lunch; Animals in Winter; Habitats. As you plan your Adaptations program, however, select a sampling of adaptations rather than heavily duplicate any of the above programs.

The goal is NOT to include everything you know about a particular species – or even every adaptation. Focus on a few key adaptations, both physical and behavioral for an animal. Ask students to identify physical features of a species, discuss the adaptive value of those features, and connect those features to behaviors when relevant. Selecting a diverse set of animals will allow you to compare and contrast adaptations.

Plan to spend about five minutes per species at a zoo habitat. Also, plan so that you have enough stops for the time allotted for your tour, with a few extras if you need substitutes. Note that a BIG Zoo Lesson tour lasts one hour and fifteen minutes. A non-BIG Zoo Lesson tour lasts one hour.

Consider a range of the following:

- Animals: Mammals, birds, reptiles
- Carnivores, herbivores, omnivores
- Adaptations that help an animal obtain food, stay safe, or live in a particular habitat
- Physical adaptations: external and internal body parts, sensory capabilities
- Behavioral adaptations, including those that may be linked to particular physical adaptations.

The animals and adaptations listed below are suggestions. You are not limited to these nor should you attempt to include them all. Consult the Animal Data Sheets for more details.

Potential Animals	Physical Adaptations	Behavioral Adaptations
Carnivores Mammals	Eye/ear placement, sense of smell, sharp teeth	
Big cats	Powerful teeth, jaws, legs, claws, Jacobson's organ, elastic stomach, cryptic camo, scent glands Snow leopard - thickness of winter fur; small, compact body; short, rounded ears, fur on bottom of feet save heat; long, heavily furred tail	Can go days without food, then eat a large amount (feast and famine diet) Sprint for short bursts, then rest and conserve energy Scent mark territory Lion social, live and hunt in pride Females hunt together to take down large prey, mostly at night or early morning Roar to locate pride members or to advertise territory Tiger and snow leopard - solitary Snow leopard - jump long distances, stalk and ambush prey from above in rocky terrain, tail curls in front of face when very cold and used for balance when jumping
Wolf	Sight, hearing; cryptic camo-white to black in color, thicker winter coat; elastic stomach, scent glands	Can go days without food, then eats a large amount (feast and famine diet) Live and hunt in group (pack), hierarchy within the group; digging, ripping, caching, energy efficient trot-can go great distances in one day, scent mark territory
Arctic fox	Sight, hearing; seasonal variation in fur color and thickness; small, compact body, short ears, muzzle, fur on bottom of feet; blue morph (our male) live in areas with less snow have winter "silver" coat	Cache, scavenge when food is scarce, dig dens for cover

Otter	Countershading, webbed feet, tail as rudder, torpedo-shaped body, oil glands to waterproof outer coat of fur, dense underfur that traps air for insulation, nostrils & ears close in water, eyesight adapted for under water, whiskers large and abundant (tactile sensation important since sense of smell, sight, and hearing is diminished under water)	Swim, catch fish and other aquatic creatures Help keep aquatic ecosystem healthy
Meerkat	Enlarged fore claws	Insectivore, diurnal, dig for insects, construct complex burrow systems, live in groups, share sentry duty, alarm call
Banded mongoose	Curved claws	Insectivore, diurnal, dig for insects, live in packs, care for young communally and even care for elderly or injured, bunch together to protect youngest in emergency
Giant anteater	Long, curved, sharp claws, no teeth but flick long tongue that extends two feet out of mouth up to 150 times per minute when searching for food	Omnivore, digs for bugs in logs, can run quickly if threatened, also good swimmers, if need to fight will rear up on their hind legs, use tail to balance, and use forelimbs and sharp claws for defense.
Red panda	Sharp incisors and canines, flat molars, sharp claws, scent glands, thick coat, countershading (red top with lichen in tree, bottom black with shadows in tree), fur on bottom of feet, long fluffy tail, elongated wrist bone acts as thumb, flexible ankles due to the way leg bones are attached	Omnivore, herbivorous carnivore, mostly bamboo Arboreal, active at dawn, dusk, and night, sleep a lot to conserve energy due to lack of nutrients it receives from bamboo, can grasp bamboo with wrist bone, can rotate ankles to climb head-first down a tree to flee quicker and keep an eye out for predators, tail for balance and warmth around face, fur on bottom of feet to better grip on moist trees
Binturong	Long, wiry black fur, whiskers, scent glands, prehensile tail, backward rotating hind legs	Omnivore, herbivorous carnivore Solitary, mostly arboreal, good climbers, fur repels water in rain forest, tail helps balance and guide climbing in trees
Herbivores Mammals	Eye/ear placement, grinding molars	
Bongo	Large, broad ears, cryptic or disruptive camo (depending on circumstances), long prehensile tongue	Herbivore, ruminant, chew cud Form herds, use horns to break and pull on high branches, pull leaves off with tongue

Rhinoceros	Prehensile lip, vision poor but hearing and sight very good, two horns, large size, short & stout limbs	Herbivore, browser Solitary and mostly diurnal, wallow in mud, symbiotic relationship with oxpeckers and egrets (birds eat bugs from rhino or grass it stirs up while rhinos get alarm call warning of possible threat)
Patagonian hare	Long ears, cryptic camouflage, gnawing incisors continuously grow, hind limbs longer & more muscular than front	Diurnal, can walk, gallop, and flee at high speeds, springing four-legged off ground (can run up to 45 mph); live and graze in open habitat; young grow up in communal burrow, but take turns feeding so that only one parental pair occupies at a time
Cape porcupine	Good hearing, gnawing incisors Quills and spines (whiskers)	Nocturnal and usually solitary Raise quills for perceived size, charge backwards to embed quills in predator, build large dens
Omnivores Mammals		
Spider monkey	Binocular vision, prehensile tail, no thumb on hands	Omnivore, diurnal, disperses seeds, arboreal, tail can support weight of body, climb, swings through trees, live in groups, groom self & others
Cotton top tamarin	Eye/ear placement, grinding molars, claws binocular vision, long tail, scent glands	Omnivore, disperse seeds Diurnal, arboreal, live in groups (more eyes and ears to detect predators), dominated by one mated pair & offspring, father & others care for non-nursing needs of young (experience for siblings), mother suppresses reproductive behavior in other females with pheromones, groom each other, many vocalizations, scent mark territory
Golden lion tamarin	Eye/ear placement, grinding molars, claws, long and slender fingers, binocular vision, long tail, scent glands	Omnivore Diurnal, arboreal, search crevices, bark, and plants for insects, live in groups (more eyes and ears to detect predators), many vocalizations, groom each other, many vocalizations, scent mark territory
Birds	Difference in bills, gizzards and use of grit, eye placement, type of feet	
Bald eagle	Eye/ear placement, hooked beak, sharp talons, great hearing and sight, feathers, hollow bones, large, wide wings	Carnivore, diurnal, bird of prey, grab and carry prey in talons, rip meat with beak, scavenge when food scarce, will scavenge prey from osprey; fly, glide and soars (energy-efficient), migrate to open water in winter
Emu	Wedge-shaped beak, strong legs, solid bones, feathers	Omnivore, disperse seeds Diurnal, solitary, flightless, can swim, can run up to 30 mph, kick as protection, males incubate and raise young, feathers provide insulation from direct sunlight, forage on

		fruits, seeds, plant shoots, small animals and insects, swallow small stones to help digestion in gizzard
Green aracari	Large, serrated beak, zygodactyl feet (like parrots)	Omnivore, disperse seeds Diurnal, grip and gather fruit (gulps down whole), can hop on branches with thick foliage or climb to search for food
Magellan penguin	Beak for grabbing and eating fish and other small sea life, insulate bodies with down feathers and fat, oil glands to waterproof outer feathers, wings as modified flippers, webbed feet, solid bones, countershading camo	Carnivore Swim and forage in open ocean, monogamous, parents take turns with incubation and feeding of young
Peafowl	Eyes on side, sharp beak that curves down, male coloration & long tail (attracting mates, female coloration (sitting on nest)	Omnivore, diurnal, solitary, roost in trees, courtship display to attract mates, dust baths to eliminate bugs and parasites; eat insects, worms, lizards, grains, greens, fruit, seeds, flowers, pebbles for grit in gizzard
Raven	Strong, thick multipurpose beak, feathers, intelligent	Omnivore Gliding/soaring flight, able to mimic sounds, cache food, able to problem solve

Reptiles		
Turtles	Shell, horny beak	Tear food, hibernates, where relevant, e.g., Michigan turtles
Snakes	Tongue used for taste/smell, Jacobson's organ, loosely hinged jaw for swallowing large prey, cryptic camouflage Massasauga rattlesnake heat sensing pits Other snakes	Carnivore Can swallow large prey Sheds skin Massasauga rattlesnake Inject venom Other snakes constrict

Concluding the Tour

Restate your theme: "During the tour we learned about how adaptations help animals survive in their habitats."

Ask a couple of review questions:

"Can someone tell me an animal and two physical adaptations that would help that animal survive in a cold climate?"

"Name another animal and tell me two behavioral adaptation that would help that animal protect itself from predators?"

"What is something you have learned today that you want to share with your family or friends?"

"Thank you for coming!"