

# Animal Adaptations Encounter

## PROGRAM DESCRIPTION

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. This program uses a variety of artifacts and biofacts to illustrate the discussion. An ambassador may be presented dependent on the needs of the animal.

## THEME

- Animals have a variety of adaptations that help them survive.

## GOALS

- To share information about adaptations with groups (typically elementary school age) using artifacts/biofacts and live animals when available.
- Present information as an inquiry based discussion rather than a lecture.
- For BIG Zoo Lesson groups, provide a culminating lesson that brings together many of the topics explored during the week.

## OBJECTIVES

- Audience will understand the concept of animal adaptations and how those adaptations give them a better chance of surviving in the wild.
- Audience will differentiate between physical (structural) and behavioral adaptations and understand that animals typically have adaptive behaviors that correspond to each physical adaptation.
- Audience should understand that by observing physical adaptations of a species we can often predict/deduce many of their behaviors and habitat use.

## KEY TERMS

**Physical (structural) adaptations, behavioral adaptations, behavior, habitat, instinct, learned, camouflage, prehensile, eye/ear location, etc.**

## RECOMMENDED ARTIFACTS/BIOFACTS

- Porcupine quills (North American and Cape)
- Sea turtle mount
- Sea turtle carapace (w/missing scutes)
- Pond turtle shell
- Box turtle shell
- Snow leopard pelt
- Carnivore skull
- Herbivore skull
- Omnivore skull
- Eagle beak
- Heron bill
- Hollow bone
- Barred owl wing
- Serrated butter knife (in barred owl wing box)
- Pictures
  - Sulcata tortoise
  - Turtle foot

## GETTING STARTED

It is important that right at the beginning of your program you establish a good understanding of the definition of adaptations!

**Adaptations:** characteristics of an animal which allow it to survive in its native habitat. Another way to say it is “anything an animal has or does to help it survive”.

- Animals acquire these features through **natural selection** –a process occurring in nature where individuals which have features best suited for survival are more likely to survive and pass those (characteristics) adaptations on to their offspring.
- Adaptations do not develop during an animal’s life but over many generations.

**Physical adaptations:** think of these as parts of the animals’ bodies that helps them to survive in their habitat. These could be things we can see or they could be internal.

- They use these tools to help them obtain food, keep safe, build homes, withstand weather, attract mates, etc.
- 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 which help different animals to survive

**Give specific examples if needed:**

- The retractable claws of a tiger allow them capture their prey,
- The tigers’ stripes allow them to hide undetected by prey.

**Ask students for examples of physical adaptations of various species and if they can then explain how the adaptations help them survive. For BZL students, have them think about their observation animal for examples.**

**Behavioral adaptations:** Things an animal does/actions an animal takes (behaviors) that help it survive.

- Behaviors are what an animal does with its body.

**Give specific examples if needed:**

- A tiger crouches motionless, waiting to ambush its prey.
- Flight in birds and bats

**Give specific examples:**

- The camouflage of a tiger allows it lie in wait and ambush its prey. The large, wide wings of an eagle provide lift and the eagle can then use these to glide and soar – a very energy-efficient way to search for prey (or flight in general)

**Have students some examples of behavioral adaptations and help them determine which physical adaptations are used during those behaviors. For BZL students, have them think about their observation animals for examples.**

**Note:** It is important to help the students draw a connection between the behavioral adaptation and the physical or structural adaptation that allows for the behavior. Some groups may need more help making the connection than others.

## Using Biofacts:

**NOTE: For BZL groups, it is important to check with Jill to find out which lessons the students have had earlier in the week. Try to use biofacts different than those they have already seen.**

**Turtles:** Have some very special adaptations. They must be effective, as turtles have not changed much in the last 60 million years!!

- Sea turtle mount
  - Physical adaptations
    - Hard shell which provides protection and is part of skeleton
    - Streamlined for faster swimming.
    - Countershading
    - Flippers instead of legs
  - **This is a good place to introduce the concept of trade-offs --every adaptation has a cost. The benefits must outweigh the costs for the adaptation to be useful**
    - Price of the shell is limited speed and range of motion
    - Many species of turtles spend a lot of time in water --water supplies buoyancy allows for faster movement
    - Compare and contrast sea turtles, semi-aquatic turtles and box turtles (use shells and pictures)
      - More streamlined shell vs more dome shaped
      - Flippers vs webbed toes vs stocky legs
      - Sea turtles can't pull their legs, head, and tail into their shell while other turtles can (another trade off)
- Porcupine quills --physical adaptation for protection from predators (show Cape porcupine quills)
  - Show North American porcupine quills, compare and contrast with Cape porcupine quills
  - Share with students behaviors which are used to make quills effective (arched back, erecting quills, thrashing tail)
  - Share that quills are specialized hairs and are loosely attached with a barb at the end (physical adaptations)
  - Notice the color (wants to be noticed, serves as a warning)
  - Have students name another Michigan mammal which used black and white colors to serve as a warning (skunk)
- Snow leopard pelt **NOTE: This is a very fragile pelt. Use 3-4 students to hold it up for the class, making sure the base of the tail is well supported.**
  - Have students note some of the physical adaptations exhibited by the pelt and they must also explain how that adaptation helps a snow leopard survive
    - Long tail helps with balance
    - Long tail to wrap around face
    - Thick fur for warmth
    - Cryptic coloration allows snow leopard to get close to prey undetected (lichens on rocks)

- Skulls
  - Show the skulls, pointing out eye placement and teeth. For most BZL classes, this will be review.
  - Herbivores- eyes on side, grinding teeth for plants
  - Carnivores- eyes in front, sharp teeth for ripping and tearing meat
  - Omnivores- eyes in front, flat and sharp to accommodate plants and meat
- Bird skulls
  - Show the eagle and heron skulls. Ask them if the beak could be a physical adaptation (yes).
  - Share with them that both birds eat fish, and the physical adaptation of the beaks lets us know that they hunt in different ways (different behaviors).
  - Share the hunting methods to illustrate.

## Presenting the Owl

### Prepare audience

- Explain they are about to see a live animal
- Review their expected behavior
- If Oslo does not participate, explain to the audience that he chose not to participate today and that for the animals to have choice and control is very important to their well-being.

**Bring out owl (either Oslo or GHO mount):** Explain what species it is and where it would be found in the wild

- Have the audience point out adaptations that this owl has, making sure they delineate whether it is a physical or behavioral adaptation and how the adaptation helps the owl to survive.
- As they point out adaptations and their benefits to the owl, help them figure the costs (trade-offs) for some of them
  - Large eyes—great vision in dim light, allows owls to hunt at night;
    - Trade-off: cannot move eyes in the socket (do eye motion demonstration), larger eyes more prone to injury; larger eyes may give the owl away during the daytime when resting.
    - Owl has additional adaptation which reduces these costs:
      - More flexible neck (do range of motion demonstration)
      - Nictitating membrane- protects eye (like goggles)
      - Camouflage eyelids- helps conceal them while sleeping
  - Talons: long, sharp, curved claws; used to catch, kill and hold prey
    - Trade-off: Cannot retract, sometimes get caught in prey
    - Point out the powerful feet of raptors, do demo with their hands
  - Ears: Point out tufts are not ears!
    - Point out facial discs and location of ears, describe asymmetry of ear openings
    - Describe how owl ears are most sensitive to sounds which are important to their survival (ask them what those sounds might be: mouse squeaks, dry crackly leaves)
  - Wings: Owls are the only birds with silent flight:
    - Show serrated feathers and butter knife 9cut through the air and decrease turbulence)
    - Two benefits: 1) allows owls to avoid detection by prey or predators; 2) Allows the owls to use their sensitive ears

- Trade-off: Owls cannot glide as high, turn as sharp or dive as fast as diurnal raptors such as hawks, eagles and falcons
- Weight
  - Have three students guess Oslo's weight (currently 2.4 kg)
  - Have students determine which adaptations allow such a large bird to be so light:
    - Lightweight covering feathers
    - Hollow bones
    - No teeth

## Conclusion:

Review the definitions of adaptations. Remind them that behavioral adaptations almost always have corresponding physical adaptations. Reinforce that some adaptations have a cost and trade off. The biggest thing to remember is that adaptations help an animal survive.