

# Amazing Adaptations

## Introduction

For animals, including people, adaptation is often a matter of life or death! If they can't adapt to their surroundings, they will not survive. For animals, adaptation means having certain body parts or behaviors that allow them to survive and thrive in their environments.

## Biofacts (props)

- Blowfish – artificial bigness – try to ward off predation
- Camel Hair – body covering – protect animals from diverse environments
- Feathers - body covering – protect animals from diverse environments
- Animal Pelt – Camouflage – adaptation to help animals blend into environment
- Teeth/skulls – herbivores vs. carnivores (teeth), predator vs. prey (eye placement)
- Large beaks – Toucan (cracking nuts) & Stork (catching/eating fish)

## Living Material

- Bearded Dragon – artificial bigness (blow up black beard & mouth gaping) & resource conservation (large bellies store food)
- Egyptian Tortoise – pale reflective colors allow to forage in the heat
- Rabbit – body covering, teeth variations, eyes on side of head and leg & feet adaptations
- Bird – feathers, wings, beaks
- Snakes – scales protect bodies from variety of terrain & helps prevent water loss; also camouflage (sand boat) or mimic poisonous snakes
- Tenrec – balling up/spines help deter predators

## Talk Outline Suggestions

1. Ask the question “How do we adapt to certain conditions?”. Solicit answers from examples below.
  - Cold (possible answers; put on more clothes, turn up the heat, etc)
  - Heat (put on lighter clothing, look for shade, turning on air conditioner)
  - Rain (seek shelter, put on rain coats & boots, use umbrella)
  - Hunger (get food from refrigerator, cabinets or restaurant)
2. Animals can't put on clothes, get food from refrigerators and use other convenient household items that we humans use. For animals, adaptation means having certain body parts or behaviors that allow them to survive and thrive in their environments.
3. We are going to use live animals and biofacts to illustrate some animal adaptations. (you can use the suggestions above or use some others that you find interesting).

*More and more species are at risk from human impact on the environment. How can you be part of the solution?*

**Biofacts (Props)**

variety of skins (snow leopard, tiger, lion, wolf)	various skulls	bird feathers
various eggs (macaw, rhea)	jaguar glove	ivory tusks
alligator products	leopard mask	turtle products
hellbender replica	sample of kudzu	

**Living Materials**

<b>Egyptian Tortoise</b>	Jacobin Pigeon*	Chilean rose-haired Tarantula**
Tree Frog***	Rat****	Goat****
Prehensile-tailed porcupine (on grounds only)		Rabbit****
		Scarlet Macaw (on grounds only)*****

The **Egyptian Tortoise** is the only *critically* endangered animal in the education collection, and has recently become extinct in its namesake country, Egypt, due to habitat loss and the pet trade. Most of the animals available could be incorporated into this program due to the fact that they all face many of the same problems, just not to the same extent as other species.

\* This species is not endangered, but a related local bird, the passenger pigeon, became extinct in early 20<sup>th</sup> century due to overhunting. (see supporting materials)

\*\* Although not endangered, many tarantulas are captured for the pet trade.

\*\*\*Amphibians are “indicator species” and decline faster than other species when pollution, ozone depletion, or climate change is a problem (an ecosystem’s “canary in a coalmine”). Note that the first animal to be driven extinct is the Golden frog from the cloud forests of Costa Rica.

\*\*\*\* Introduced species which can cause others to go extinct.

\*\*\*\*\* The scarlet macaw is not endangered, but most species of macaw and many other tropical parrots are, due to the pet trade and habitat loss. If program is on grounds, you can point out our Hyacinth Macaws.

**Objectives**

Knowledge (grade info is first introduced, touch upon in subsequent grades)

1. Explain how technologies can influence all living things. (6)
2. Explain that freshwater, limited in supply and uneven in distribution, is essential for life and also for most industrial processes. Understand that this resource can be depleted or polluted, making it unavailable or unsuitable for life. (6)
3. Explain that human activities such as reducing the amount of forest cover, increasing the amount and variety of chemicals released into the atmosphere, and intensive farming, have changed the capacity of the environment to support some life forms. (6)
4. Explain that in all environments, such as freshwater, marine, forest, desert, grassland, mountain, and others, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter. In any environment, the growth and survival of organisms depend on the physical conditions. (6)
5. Explain that technologies often have drawbacks as well as benefits. Consider a technology, such as the use of pesticides, which help some organisms but may hurt others, either deliberately or inadvertently. (7)

6. Explain why technology issues are rarely simple and one-sided because contending groups may have different values and priorities. (8)

### Possible Talk Outline

1. Discuss the differences between threatened, endangered, and extinct species.

**Threatened**—any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

**Endangered**—any species that is in danger of extinction throughout all or a significant portion of its range.

**Extinct**—any species that is no longer in existence.

Remind students that animals AND plants can be threatened, endangered, or extinct. It is not frequently recognized that plants are included in these lists.

2. Identify the main causes for endangerment. The acronym HIPPO is an excellent way to introduce these causes.

**Habitat destruction** — Total destruction and fragmentation of habitats. (For example: when roads are cut into forest areas, introduces a whole new set of problems for the forest inhabitants such as new predators, diseases, light, etc.)

**Introduced Species** — Damages the native species due to increased competition, predation, and diseases. (For example: rat, rabbit, Dutch elm, cattle, etc.)

**Population (Over)** — by humans and domestic animals also

**Pollution** — Food Chain Amplification; pollution does not just affect one organism, the effects will filter down to all organisms within that system. (For example: DDT and birds, particularly fish eaters like eagles)

**Over-Consumption** — Directly (pet/horticultural industry, pelts, parts)  
Indirectly (water, soil, wood)

\*\*You may want to emphasize that humans are ultimately responsible for the above causes of endangerment, therefore, we need to be conscious of our actions.\*\*

3. Discuss reasons for why we need to save these threatened and endangered species.

Several possible reasons are listed below. Encourage students to come up with additional reasons to help.

Medical—rainforests species may provide many medicines

Agricultural—potential food sources

Ecological—healthy ecosystems rely on all links of the food web

Commercial—ie: salmon fishing

Aesthetic/Recreational—travel, photography, fishing, hunting

4. Help student to develop a plan of action as to what can be done to help these threatened and endangered species and also what can be done to prevent others from becoming threatened or endangered. Again, several reasons are listed below, but also encourage additional suggestions.

Conserve (wildlife parks, zoos)

Recycle, Reduce, Reuse (turn off lights to reduce resources used)

Make space for wildlife (plant a tree)

Plant native plants and control introduced species

Join an organization; make your voice heard (write letters to politicians, sign 96 elephants petition etc)

Adopt a monarch

Plants can be endangered as well as animals (kudzu, local endangered, ovate catchfly)

Not just in the rainforest etc but locally: list/pictures, guessing game, locally endangered animals on DNR website, disappearance of local habitats, wetlands, remains like WWNP and Twin Swamps,

Hovey Lake, Howell Wetlands

Local bats a big one, hellbenders

Supporting materials: page on Martha, info/pictures of locally endangered or threatened species, local wetlands etc

*How is an animal’s food reflected in its shape?*

**Possible Biofacts (Props)**

Large carnivore skull *	Talon	Scissors
Herbivore skull	Camouflage pelt (tiger, ocelot)	Mortar & Pestle
Rodent skull		Fork
Crocodile skull	Generalist skull - Opossum, raccoon	Knife (spoon for the daring)

\* There are many possibilities: the lion’s teeth are worn (old) but it is good illustration of why you should brush; clouded leopard has excellent canines; and wolf has the same types of teeth that humans do.

**Tip:** Number and type of biofacts (props) will depend on age of audience (younger the crowd, less complex the biofacts) and the specific animals being brought.

**Living Material**

Make sure to bring at least one predator and one herbivore, a comparison between similar diets is also recommended.

<b>Diet</b>	<b>Docent Animals</b>
Predator	Baja Rosy Boa, Kenyan Sand Boa, California King Snake, Colombian Red-tailed Boa, Inland Bearded Dragon, Chilean Rose-haired Tarantula
Herbivore	Rabbit, Ancona Duck, Guinea Pigs, Miniature Donkey and Horse, Prehensile Tailed Skink, Egyptian Tortoise
Granivore/frugivore	Hybrid Macaw, Jacobin Pigeon
Insectivore	Tenrec
Omnivore	Norway Rat, Nigerian Dwarf Goat, Blue-tongued Skink, White’s Tree Frog
Detritivore	Madagascar Hissing Cockroach, Millipede

**Objectives**

1. The food that animals eat influences their shape and their senses.
2. Many predators have similar structural adaptations (as do herbivores, etc.)
3. Mammalian teeth are specially designed for different jobs.

**General Tips**

Start at the head and move back. In general we will be discussing finding food (senses), eating food (teeth, beaks, claws), and some digestion. Of course, it is appropriate to give a “thumbnail” sketch of each animal’s natural history or cool features. Get kids involved. I recommend illustrating your points on the animals and ending the talk with the touching opportunity, but try it several ways and see how it works best for you.

**Possible Talk Outline**

Finding food – role of the senses

(If group is old enough, be sure to point out that senses can help you avoid being eaten, too.)

1. Sight  
color vision is very important for frugivores (fruit eaters)  
How can you tell when a tomato is ripe? Etc  
binocular vision important for predators (judging distances, etc)
2. Smell  
important for finding water, food (predators and herbivores)
3. Sound  
See if they can think of an example - usually someone will think of bats, also foxes and coyotes in winter when rodents are below snow
4. Touch  
not used much to find food, possible to move in underground dark, familiar burrows
5. Taste  
fish  
Snakes (forked tongue allows triangulation)  
taste can also be used to determine if food is edible
6. Electric field detection (don't know what this sense is called)  
sharks

Eating

You are what you eat.

1. Does everyone know what teeth are?
  - You have teeth. Lost teeth and adult teeth.
2. What else is in your mouth?
  - Encourage or wait for someone to say “tongue” – see teeth chart below
3. What do you have teeth for?
  - Chewing, eating, biting, biting other people.
  - Point out that they have different kinds of teeth, even have them locate these teeth in their mouths.

4. What kinds of animals have teeth?
  - Carnivores, cows, horses,
  - Shark (always making teeth and pushing teeth forward)
  - Rodents (teeth that grow forever, enamel coating makes them ever sharp)
  - Go through a bunch of examples
  
5. We (mammals) have many different kinds of teeth.
  - Have them count the number of different kinds in their mouth (4 sometimes 5) – generally best to do this before touching animals. They *will* put their fingers in their mouths.
  - Use the large carnivore skull to help them go through their mouths
  - Point out that they have different kinds of teeth, even have them locate these teeth in their mouths.
  
6. The teeth all do different jobs (point out teeth on skull)

<b>Five – dollar name</b>	<b>Job</b>	<b>Equivalent</b>
Carnassials	Scissoring, shearing	Scissors
Molars	Crushing	Mortar & pestle
Incisors	Grabbing/holding	Fork
Canines	Slicing (or stab into flesh)	Knife
Tongue	Slurping/ drinking	Spoon
Premolars	Little bit of everything	Spork

Finish up by having them meet your teeth models.

**Other activities:** “Fill the Bill” involves experimenting to determine which type of “beak” (a tool like eyedropper or tweezers) works best to eat that particular bird’s food (like nectar, fruit or seeds). Activity box is on the replica shelf.