



Survival of the Fittest – Adaptations and Natural Selection

The purpose of this activity is to encourage you to observe an animal and discover various adaptations that help the individual survive. An adaptation is a modification or changes to structure, behavior or physiology in order to better survive in a habitat or lifestyle. Normally, these changes occur slowly over many years. They are the result of random genetic “accidents” (mutations) that prove to be helpful. Behavioral adaptations may occur as a result of a learned behavior that is passed down. Every animal is a conglomeration of adaptations that allow it to survive.

Types of adaptations:

1. physiological – involve body processes
2. morphological – involve the shape or structure of the animal
3. behavioral – involve the way the animal acts in a particular situation

Reasons adaptations occur:

1. a change in the food supply
2. something happens to its niche
3. an environmental change occurs
4. prey has to adapt if its predator disappears
5. predator has to adapt if its prey disappears

A generalist will survive, whereas a specialist may not. A generalist is an organism, such as a rat, that has no special adaptations, can exploit many resources, and is in competition with other organisms for resources. A specialist is an organism, like a koala, that is adapted to exploit a particular resource to avoid competition.

Before coming to the Birmingham Zoo you will need to choose an animal from the attached list and research its habitat. You will need this research to help you answer the questions in part two of this activity.

Part I: Variation Within a Species

In this part of the activity, you will study a particular type of organisms and decide whether or not organisms of the same species will show some variation within the species.

1. Choose an animal (species) in the zoo that is represented by at least two different individual specimens. Write its common and scientific name.
2. What is the specific location of the animal within the zoo?
3. Examine your animals in detail, and list as many individual differences as possible for the species in question. (Ex: hair length, fur color, etc.)
4. Discuss the role of variation within a species in the process of natural selection.

Part II: Adaptation to the Environment

In this section, you are to examine the natural environment in which the animal you have chosen lives. Try to see what general characteristics make the animal fit well into its environment.

5. Write a paragraph that discusses the environment in which the animal you have chosen lives. Be as specific as you can.
6. List the characteristics that you believe help the animal fit into its environment and describe how they help the animal. (Ex: long fur to help the animal stay warm in cold temperatures)
7. List a few general characteristics of an animal that would be poorly suited to your animal's environment.
8. Discuss the advantages and disadvantages of having particular characteristics in relation to the process of natural selection.

Part III: Convergent Natural Selection

In its most general form, *convergent natural selection* is a trend that produces similarities between unrelated organisms because they share a common environment. (Ex: whales & fish both have fins for swimming, but are in separate classes) Pressure from the environment has dictated that to survive animals living there must share the same adaptations.

In this section you are to find an animal that lives in the *same type* of environment as the animal you chose. This means that if you chose an animal that lives in the desert in Africa your second animal could live in a desert in North America.

9. Choose an animal in the zoo that lives in the same type of environment as the first animal you chose. Write the common and scientific names of the second animal.
10. What is the specific location of the animal in the zoo?
11. Examine the second animal and list the characteristics it has in common with the first animal you chose.
12. Why do you think the two animals that share a common environment have so many characteristics in common?
13. State and discuss the relationships, if any, between the two organisms that you have chosen. Relationships include parasitism, commensalisms, mutualism, predator-prey, competitors.

Part IV: Future Natural Selection

Think back to the first animal you chose and try to imagine what natural selection would do to this animal if its environment started to change to a completely different one. For example, your animal is a desert animal and you want to predict how it would change if the environment slowly became more like a woodland.

14. Choose a new environment into which the old one will change. Specifically, what will be different about it?

15. Choose at least five different characteristics seen in the animal at present. Illustrate how these characteristics will have to change as the environment changes, for the species to survive.
16. Do you think that the animal in question will be able to adapt to live in the new environment proposed for it? Think back to the variation within the species that you recorded from part one. Do any of the individuals that you have observed have any of the characteristics that would enable it to survive and reproduce as the environment changes?

Birmingham Zoo Animals, Their Biomes & Location

Reptile Building

Tropical Forest

Reticulate Python
Cook's Tree Boa
Emerald Tree Boa
Red-Tailed Boa
Green Iguana
Habu Viper
Marine Toad
Pacific Boa
Painted Bataguar Turtle
Green Anaconda

Desert

Aruba Island Rattlesnake
Chuckwalla
African Pancake Tortoise
Desert Tortoise
Gila Monster
Mexican Beaded Lizard

Temperate Forest

Pine Snake
Timber Rattlesnake
Diamondback
Rattlesnake
Copperhead

Birds & Surrounding Area

Tropical Forest

Swainson's Toucan
Spectacled Owl
Lorikeet
Silvery-Cheeked Hornbill
Double-Wattled Cassowary

Desert

Cinerosus Vulture

Temperate Forest

Bali Mynah

Grasslands

Red-Billed Hornbill

Aquatic

American Alligator
Chilean Flamingo
Caribbean Flamingo
Scarlet Ibis
Sea Lions
Roseate Spoonbill

Primate Building

There is a rainforest exhibit in the middle of the building.

Tropical Forest

Cotton-Top Tamarin
Gorilla
Ring-Tailed Lemur
Pygmy Marmoset
Spider Monkey
Blue-Bellied Roller
Buffalo Weaver

Desert

Temperate Forest

Gibbon

Grassland

Mandrill Baboon

Aquatic

Blind Cavefish

Elephant Building & Surrounding Area

Tropical Forest

Asian Elephant

Desert

Camel

Temperate Forest

Grassland

Bison
Cheetah
Maned Wolves

Aquatic

Hippopotamus

Savannah & Surrounding Area

Grassland

Gazelle
Giraffe
Kudu
Ostrich
Zebra

Aquatic

Sitatunga (swampy forests & grasslands)

Predator Building & Surrounding Area

Tropical Forest

Fishing Cat
Tayra

Desert

Fennec Fox
Pallas' Cat

Temperate Forest

Bald Eagle

Grassland

Aquatic

North American River Otter
Asian-Small Clawed Otter

Children's Zoo

Temperate Forest

Barn Owl

Desert

Tropical Forest

Aquatic

River Cooter
Red-Eared Slider
Largemouth Bass
Bream (Bluegill)
Spotted Gar

Grassland