

SKELETONS: Museum of Osteology

Locomotion and Skeletal Adaptations

Teacher Resource

Grade Levels: 3rd - 5th

3rd-5th Grade Oklahoma Academic Standards (OAS)

3-LS1-1 From Molecules to Organisms: Structure and Processes

3-LS1-1: Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS2-1 Ecosystems: Interactions, Energy, and Dynamics

3-LS2-1: Construct an argument that some animals form groups that help members survive.

3-LS3-1 Heredity: Inheritance and Variation of Traits

3-LS3-1: Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS3-2 Heredity: Inheritance and Variation of Traits

3-LS3-2: Use evidence to support the explanation that traits can be influenced by the environment.

3-LS4-2 Biological Unity and Diversity

3-LS4-2: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving and reproducing.

3-LS4-3 Biological Unity and Diversity

3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

4-LS1-1 From Molecules to Organisms: Structure and Processes

4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-LS1-2 From Molecules to Organisms: Structure and Processes

4-LS1-2: Use a model to describe that animals' receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

5-PS3-1 Energy

5-PS3-1: Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

Program Overview

Locomotion and Skeletal Adaptation will familiarize students to six modes of animal locomotion through hands-on observation of various skeletal specimens. The participants will then work in teams to evaluate a skeletal specimen to define a particular type of movement, and then communicate their findings to the class.

Learning Objectives:

- Participants will successfully identify modes of locomotion by examining skeletal adaptations in a number of different species of animals.
- Participants will successfully work in a team environment and communicate their observations to their fellow classmates.

Background

Adaptation is a process of nature in which an organism becomes better suited to its habitat. Adaptations can be found throughout nature. In vertebrate species, these adaptations often affect the skeletal system. One obvious example of skeletal adaptation can be found in locomotion.

Aerial Locomotion (“*Flight*”): is the act of flying. Skeletal adaptations aid in aerial locomotion by providing modified limb bones to form a wing as well as allow for muscle attachment. In bats, the only mammals capable of true flight, elongated arm and finger bones, combined with modified skin, form wings allowing them to fly.

Arboreal Locomotion (“*Tree Climbing*”): refers to species that live in and move through trees. These animals often possess physical adaptations that aid in this movement. These adaptations may include long limbs, prehensile tail, and claws. Animals that exhibit arboreal locomotion include squirrels, sloths, and monkeys.

Aquatic Locomotion (“*Swimming*”): as well as semi-aquatic locomotion, describes an animal’s movement in the water. Many species that live in the water possess aquatic locomotion to aid in their survival. Limbs modified into flippers are one of the most common skeletal adaptations found in aquatic species. Some animals exhibiting aquatic locomotion include dolphins, sea turtles, and penguins.

Cursorial Locomotion (“*Running*”): is the type of locomotion most terrestrial animals use to move about. This form of locomotion primarily refers to running. Many species exhibiting this type of movement have developed skeletal adaptations such as longer limbs, the reduction of toes, modification of the feet and development of hooves. Some cursorial species are dogs, cats, horses, and gazelles.

Fossorial Locomotion (“*Digging*”): as well as semi-fossorial locomotion refers to the modified movement of animals that dig and live underground. These species often have modified limbs to aid in digging, as well as, compact bodies and rudimentary eyes. Some fossorial species include gophers, moles, and mole rats.

Saltatorial Locomotion (“*Jumping*”): animals that use hopping or jumping to move. Species utilizing this form of locomotion have evolved large, muscular hind limbs and often have reduced forelimbs. Some saltatorial species include rabbits, kangaroos, and gerbils.

Lateral Undulation (“*Slithering*”): the most common side-to-side motion of snakes. It is achieved by the snake contracting muscles on one side of its body and then the other, resulting in a serpentine motion. Snakes using this motion on land will usually push off of irregularities in the landscape using their belly scales. Other types of movement used by snakes are concertina, rectilinear, and sidewinding.

Vocabulary

Adaptation: a process of nature in which an animal becomes better suited to its habitat

Aerial Locomotion (“Flight”): is the act of flying

Arboreal Locomotion (“Tree Climbing”): applies to animals that live in and move through trees

Aquatic Locomotion (“Swimming”): describes an animal’s movement in the water

Carnivore: animals that primarily eat meat

Cursorial Locomotion (“Running”): most land animals move about using this type of locomotion

Fossorial Locomotion (“Digging”): movement of animals that dig and live underground

Habitat: soil, water, climate, plants and animals of a particular ecosystem

Herbivore: animals that primarily eat plants

Saltatorial Locomotion (“Jumping”): movement of animals that hop or jump

Predator: animals that attack and eat other animals

Prey: animals that are attacked and eaten by other animals

Vertebrate: animals with backbones

Lateral Undulation (“Slithering”): the most common side-to-side motion exhibited by snakes

Reference: visit the SKELETONS: Museum of Osteology Education web page at:

<http://skeletonmuseum.com/education>

Recommended Reading:

Alexander, R. McNeill

2006 *Principles of Animal Locomotion*. Princeton University Press, Princeton, NJ

Stockland, Patricia M.

2005 *Swing, Slither, or Swim: A Book About Animal Movements*. Picture Window Books, Mankato, MN.

While at SKELETONS:

- Have students visit the exhibits to identify the locomotive behavior of selected specimens.
- Have students visit the exhibits to identify the various types of locomotion that the creatures use to move about.
- Visit the Locomotion Exhibit and compare the skeletal structure of the Cheetah as it is running to the 3D Cheetah model.
- Visit the Primate Exhibit to see how some primates utilize arboreal locomotion.
- Visit the Reptile Exhibit and discuss how the 20-foot Burmese Python is able to move from place to place without any limb bones.
- Have students look for the Tiger chasing the Blackbuck Antelope to see their predator-prey relationship in motion.
- Have students gently mimic the various types of locomotion in each exhibit.