

SKELETONS: Museum of Osteology

Locomotion and Skeletal Adaptations

Teacher Resource

Grade Levels: 3rd - 5th

3rd Grade:

Florida Next Generation Sunshine State Science Standards

SC.3.N.1.1 - Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

SC.3.N.1.2 -- Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.

SC.3.N.1.3 - Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.

SC.3.N.1.4 - Recognize the importance of communication among scientists.

SC.3.N.1.5 - Recognize that scientists question, discuss, and check each other's evidence and explanations.

SC.3.N.1.6 -- Infer based on observation

SC.3.L.15.1 -- Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

SC.3.L.17.1 - Describe how animals and plants respond to changing seasons.

4th Grade:

Florida Next Generation Sunshine State Science Standards

SC.4.N.1.1 - Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

SC.4.N.1.2 - Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.

SC.4.N.1.3 - Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.

SC.4.N.1.4 - Attempt reasonable answers to scientific questions and cite evidence in support.

SC.4.N.1.5 - Compare the methods and results of investigations done by other classmates.

SC.4.N.1.7 - Recognize and explain that scientists base their explanations on evidence.

SC.4.L.16.2 - Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.

SC.4.L.16.3 - Recognize that animal behaviors may be shaped by heredity and learning.

5th Grade:

Florida Next Generation Sunshine State Science Standards

SC.5.N.1.1 - Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.5.N.2.2 - Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others.

SC.5.L.14.1 - Recognize body parts related to movement and the five senses.

SC.5.L.14.2 - Observe plants and animals and recognize how they are alike in the way they look.

SC.5.L.15.1 - Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.

SC.5.L.17.1 - Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.

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 finds to the class.

Learning Objectives:

- Participants will successfully identify modes of location 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:

Gilbert, B. Miles

1990 *Mammalian Osteology*. Missouri Archaeological Society, Columbia, MO.

Roest, Aryan I.

1991 *A Key Guide to Mammal Skulls and Lower Jaws*. Mad River Press, Inc., Eureka, CA.

Searfoss, Glen

1995 *Skulls and Bones*. Stackpole Books, Mechanicsburg, PA.

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.