SKELETONS: Museum of Osteology

Tooth and Eye "Dentification"

Teacher Resource

Grade Levels: 3rd – 5th Grade

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.

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.17.2 - Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.

SC.4.L.17.3 - Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.

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:

Tooth and Eye "Dentification" will enable students to discover dentition and vision adaptations that allow mammals to survive in a variety of ecosystems. Through the hands-on investigation of specimens your students will study the teeth and eyes of herbivores, carnivores and omnivores.

Learning Objectives:

- Participants will successfully identify herbivores, omnivores, and carnivores by examining teeth on various skulls.
- Participants will successfully identify predators and prey by examining eye placement on various skulls.
- Participants will successfully identify nocturnal and diurnal animals by examining the size of the eye socket.
- Participants will successfully work in a team environment and communicate their observations to their team.

Background:

Mammals, as well as some reptiles, amphibians and fish, have teeth. The teeth of an animal can tell you a lot about that animal's life. The type, shape and number of teeth an animal has can help determine its diet. If a mammal has long, sharp canines, it was most likely a predator. Canines are used for grabbing, holding and killing prey. Some meat eating mammals (carnivores) have sharp shearing cheek-teeth called carnassials. These teeth act like a scissor to cut through tough flesh and to break it into smaller pieces for swallowing and digestion. Examples of carnivores include cats, dogs and weasels.

Plant eating animals tend to have teeth specialized in chewing various parts of plants. Some plant eaters eat grasses (grazers), some eat twigs, leaves and berries (browsers) while others eat only specific plant parts (I.e. roots, fruit, etc.). In order to properly digest vegetation, an animal must chew its food to help break down the plant. Most herbivores have cheek teeth called molars. These molars help grind leaves, stems, grasses, fruit and even seeds before the animal swallows them. Examples of herbivores include deer, rabbits and cattle.

Some animals eat both plants and animals (omnivores) and have both types of teeth. Examples of omnivores include pigs, bears and humans.

What do the eye sockets, (orbits) of a skull tell you about an animal? A lot! Eye sockets that are large in relation to the size of an animal's skull may suggest an animal is active at night (nocturnal), or near dusk and dawn (crepuscular). In this case, a larger eye has evolved to allow the animal to see better in lower light conditions.

Eyes also tell us a lot about an animal. Eyes that face forward on a skull suggest a predator. Forward facing eyes allow for binocular or stereoscopic vision, which allows an animal to see and judge depth. Predators need this depth perception to track and pursue prey. Cats and owls are excellent examples of predators that use forward facing eyes when hunting their prey. Monkeys also have forward facing eyes that give them depth perception needed to swing and leap in their tree top habitat. Humans have forward facing eyes as well.

Animals with eyes that are located on the side of its head would suggest a prey animal. Side eye placement allows for greater peripheral or side vision. This enables the animal to see predators approaching from the side as well as from behind. This vision is very important for protecting an animal when it is grazing or feeding.

"Eyes in the front, the animal hunts."

"Eyes on the side, the animal hides."

Vocabulary:

Adaptation: Changes in behavior and/or physiology of an animal to better suit it to its environment

Binocular vision: Enables an animal to see and judge depth also stereoscopic vision

Browser: Herbivores that primarily eat twigs, leaves and berries

Carnassial: A carnivore's cheek teeth specialized for shearing meat

Canine teeth: Teeth that are pointed and conical, located between the incisors and premolars

Carnivore: Animals that primarily eat meat

Dentition: An animal's teeth used to acquire food, for defense, grooming and display

Diurnal: Refers to animals that are more active during the day

Food Chain: The transfer of energy from one type of plant or animal to another

Grazer: Herbivores that primarily eat grasses

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

Herbivore: Animals that primarily eat plants

Incisors: The front cutting teeth located anterior to the canine teeth

Molars: The rear grinding/shearing teeth located posterior to the premolars

Nocturnal: Refers to animals that are more active at night time

Omnivore: Animals that eat both plants and meat

Orbit: The bony socket in which the eye fits and serves as protection

Peripheral vision: enables the animal to see predators approaching from the side as well as from behind

Predator: Animals that attack and eat other animals

Premolars: Teeth located between the canines and molars used to hold prey, assist in cutting and/or grinding

Prey: Animals that are attacked and eaten by other animals

Shelter: Somewhere for animals to hide, sleep, raise young, etc.

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 various categories of dentition and vision.
- Have students discuss tooth and eye adaptations and what they tell about the animal's diet and vision.