SKELETONS: Museum of Osteology

Tooth and Eye "Dentification"
Teacher Resource

Grade Levels: 3rd – 5th Grade

3rd-5th Grade Oklahoma Academic 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-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.

3-LS4-4 Biological Unity and Diversity
3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

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:
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.

<u>While at SKELETONS:</u>

- 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.