

# SKELETONS: Museum of Osteology

## Keys to Identification

*Teacher Resource*

### Grade Levels: 6<sup>th</sup> - 8<sup>th</sup> Grade

#### 6<sup>th</sup> Grade:

##### **Florida Next Generation Sunshine State Science Standards**

*SC.6.N.1.1* - Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

*SC.6.N.1.4* -- Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.

*SC.6.N.1.5* -- Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.

*SC.6.N.2.2* -- Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.

*SC.6.L.15.1* - Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.

#### 7<sup>th</sup> Grade:

##### **Florida Next Generation Sunshine State Science Standards**

*SC.7.N.1.1* - Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

*SC.7.N.1.5* - Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.

*SC.7.N.1.7* - Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.

*SC.7.N.2.1* - Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.

*SC.7.L.17.2* - Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.

#### 8<sup>th</sup> Grade:

##### **Florida Next Generation Sunshine State Science Standards**

*SC.8.N.1.1* - Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

*SC.8.N.1.4* - Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.

*SC.8.N.1.5* - Analyze the methods used to develop a scientific explanation as seen in different fields of science.

*SC.8.N.1.6* - Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.

*SC.8.N.2.2* - Discuss what characterizes science and its methods.

### **Program Overview:**

In the *Keys to Identification* program, students will work in teams to locate and measure various skull features. Then using dichotomous keys and rulers, team members will identify various types of animals including but not limited to: mink, striped skunk, gray squirrel, bob cat, beaver, gray fox, opossum, rabbit, and raccoon. Emphasis will be placed on the student's ability to verbally communicate the identification process.

### **Learning Objectives:**

- Participants will successfully measure various skulls, and locate features such as incisors, cheek teeth, canines, and post orbital crests.
- Participants will successfully use a dichotomous key to identify various mammals.
- Participants will successfully work in a team environment, and communicate their ideas with team members

### **Background:**

When looking at skulls, the first question usually asked is "What kind of skull is that?" Skull identification can be determined by several methods. If you are unsure of a skull's identification, you can compare it with other known specimens. This, however, can be less than accurate and most will not have access to a large collection of known species. The most effective means of identifying a skull is with the use of a dichotomous key. A dichotomous key allows a person, through a series of questions, to identify an organism to species by process of elimination. Plants, fish and even skulls can be identified using this method.

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). In this case, a larger eye has evolved to allow the animal to see better at night.

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.

### **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:** Animal's teeth used to acquire food, for defense, grooming and display

**Dichotomous key:** Through a series of questions, skulls can be identified by the process of elimination

**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

**Reference:** visit the SKELETONS: Museum of Osteology 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:**

- Visit the exhibits and have your students discuss the processes that they would use to identify various types of skulls.
- Visit the Touch Table to identify mystery skulls from a number of different mammals.
- Look at the similarities on skull and skeletal structure within certain groups of animals such as Cats, Wild Dogs, Rodents, Primates, and Reptiles.