SKULLS TELL IT ALL

Compare characteristics of skulls of carnivores, herbivores, and omnivores. Describe different adaptations of predators and prey evident in their teeth and skull shape.

Science Standards Correlation

SC04-S4C1-01,
SC03-S4C4-01/03

Objectives

Students should:

- Identify vital prey/ predator body parts and describe their functions.
- Identify physical and behavioral adaptations of predators and prey that allow them to survive.

Materials

- Copy of *Student Handout - Skulls Tell It All* for each student
- blackboard

Vocabulary

Canine teeth
Carnivore
Herbivore
Incisors
Molars
Omnivore

Background

The types of teeth an animal has, and the placement of its eye sockets, can indicate if the animal is a plant eater (herbivore), meat eater (carnivore), or consumer of both plants and meat (omnivore.) By looking at a mammal's skull, we can find clues to what it may eat and whether it is a predator or prey animal.

Teeth

There are different kinds of teeth to perform different functions. Incisors are in the front of the mouth and used for food gathering. They snip vegetation or nip off small pieces of foods such as bark, nuts, fruit, or meat. Canines are also positioned at the front of the mouth. They are the sharp piercing and tearing "knives" of predators and are used to kill prey. In the sides of the mouth are premolars and molars. (In this activity for the sake of simplicity we will only identify molars.) Molars vary in shape or size depending on their function. Some function like scissors for slicing meat. Others serve as grinders for grinding foods like grass, leaves, and bones. All of these teeth types may be present in different numbers from species to species, or some may not be present at all.

Eye sockets

Eye placement varies among animals depending on the role of eyesight in their lives. Many prey animals have eye sockets that position the eyes on the side of the head. This allows for a wide range of view to the side and back and helps prey animals, often herbivores, see a predator moving in the periphery. Predators, however, generally have eyes that face forward. This provides the visual acuity and depth perception needed for a predator to pursue fleeing prey.

In this activity, students will learn about the above features and compare pictures of the skulls of a carnivore (mountain lion), herbivore (deer), and omnivore (coyote.)

Getting Ready

Make a copy of *Student Handout - Skulls Tell It All* for each student.

Doing the Activity

Setting the Stage

1) Have the students recall the animals seen in the *Hunters and Hunted Discovery Class*. Sketch the "Animals and their Foods" chart (below) on the board. List the animals in the "Animals" column.
2) Ask the students, "What did these animals eat?" As they review their diets, write the foods in the "Food" column next to each animal's name. (See chart.)
3) Go through the list and have the students classify the foods as either "animals" or "plants." Write these terms in the "Food Type" column next to the foods of choice. Ask the students which animals only eat meat or other animals. (snake, toad, and hawk) Which one eats both meat and plants? (ringtail or fox)
4) Point out that some animals only eat

Animals and their Foods

Animal	Foods	Food type
S.D. Toad	insects, spiders	animals (carnivore)
snake	rats, mice	animals (carnivore)
hawk	rabbits, ground squirrels	animals (carnivore)
ringtail or fox	fruit, insects, mice	plants & animals (omnivore)
rabbit etc.	plants (flowers, grasses)	plants (herbivore)

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plants. Ask the students if they can think of an example of an animal that is a plant eater. (rabbit, tortoise, cow) Add this animal to the list. Now explain that there are words for each of these different kinds of eaters. Introduce the terms carnivore, omnivore, and herbivore and write them next to animals, plants, or both as seen in the chart.

5) Explain that you are going to have them study drawings of the skulls and teeth of three mammals – an herbivore, omnivore, and carnivore – to see how they might give clues as to the kinds of foods the animals eat and whether they are predators or prey. Pass out *Student Handout - Skulls Tell It All* to each student.

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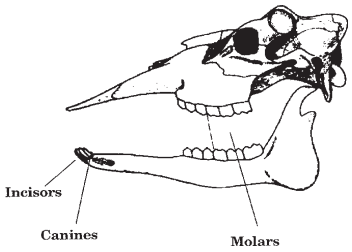
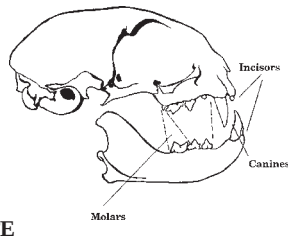
DEER

1) Direct the students' attention to the deer skull. Ask, "Who can tell me what a deer eats?" (Plants: leaves, branches, twigs.) Ask, "How does it eat these foods?" (It snips them off the plant then grinds and slices them up.)
2) Explain that deer have snipping teeth to help them tear leaves and twigs from bushes and trees. These are called **incisors**. Have the students run their tongues along the edges of their front teeth, and point out that we have incisors, too. We have them on top and on the bottom. Ask if this is the same with the deer. (No, they only have them on the bottom.)
4) Write the terms "snip," "collect," "slice," and "grind" on the board. In the space below the term "incisors," have the students fill in their function: To snip and collect food. Then explain that once they snip their food with their incisors, they need to chew it up to be able to swallow it. They use teeth called **molars** to do this. Again have the students compare their own teeth, running their tongues along their molars. Ask, "Are our molars flat or jagged?" (flat)
5) Explain that deer molars are more jagged than ours to help them slice and grind their food. Then have the students fill in the function: To slice and grind food.



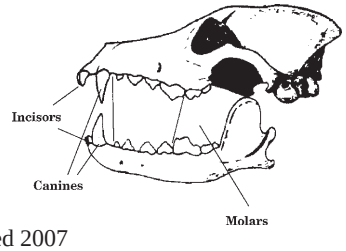
MOUNTAIN LION

6) Next have the students look at the mountain lion skull. Ask, "Do mountain lions have incisors?" (yes) "Do they have molars?" (yes) Ask, "Do you notice any other kind of teeth on the mountain lion that we have not talked about yet?" (canines) "What do you think these teeth are for?" (To kill prey and tear up meat.)
7) Explain that cats grab their prey with their claws and kill it with their canine teeth. The canine teeth are like a predator's knives. See if the students can find their own canine teeth. Can they feel the sharp points with their tongues? Have them fill in the function below "canine teeth" as follows: To kill prey.
8) Explain that after they kill it, cats tear up the food in big pieces with their canines and incisors. Ask, "How do they make the meat smaller to swallow it?" (They use their molars.) Explain that cat molars are sharper than deer molars, and that they work like scissors to cut the meat into smaller pieces. Unlike deer, cats cannot move their jaws sideways to grind their molars together, so they must slice the meat into smaller chunks. Have them write the molar function as follows: To cut meat.



COYOTE

9) Now look at the coyote skull picture. Ask, "How are a coyote's teeth similar to the deer and mountain lion?" (Coyotes have incisors, molars, and canines.) Ask the students what kinds of foods coyotes eat? (rabbits, fruits, seeds) Explain that coyotes eat both meat and plants, so they have teeth that help them eat both. This is especially obvious in their molars, which are used to both grind and cut food. Have them fill in the function of all three teeth types as follows: incisors – to snip and collect food; canines – to kill prey; molars – To grind and cut food.



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Eye Sockets

10) Next have the students look at the eye sockets in the drawings of each animal. Ask, "Do the eyes all seem to be facing the same way on the head of each animal?" (No.) "Which one has eye sockets that seem to face more to the side than the others?" (the deer) Ask the students, "Why do you think this could be?" Discuss their answers and explain that deer are prey animals, and they need to be able to see all around them to watch for the movement of predators.

11) Similarly discuss the skulls and eye placement of the mountain lion and coyote. Ask, "Why would a mountain lion or coyote have eyes pointing more forward?" (So they can focus on the prey they are hunting.) Explain that forward-facing eyes, like ours, give animals binocular vision. This helps them know exactly what they are seeing and judge distances better - skills necessary for predators. Prey animals watch for movement to warn them of approaching predators and give them time to escape.

Completing the Handout

12)With this information, have the students read the short passages next to each skull and fill in the blanks with the words provided. Discuss the answers as a group.

Discussion

1) Review the meaning of the terms herbivore, omnivore, and carnivore with the students. Which animal is an herbivore? (deer) Omnivore? (coyote) Carnivore? (mountain lion)

2) Which animal is a prey animal? (deer) Ask the students if, from this sample, they think prey animals tend to be herbivores or carnivores. Can they think of any other prey animals and give examples of their diets? (rabbits, mice) Would they expect the skull of these animals to look more like the deer or more like the mountain lion and coyote?

3) Give the example of rabbits. Rabbits have a skull more like a deer, with eyes placed on the sides of the head and incisors and molars the predominant tools for snipping and grinding food. Many herbivores are prey for carnivores, so they have a general skull structure that reflects their diet and their need to watch out for predators. Remind the students that being a carnivore does not automatically prevent an animal from being a larger carnivore's prey. Insect eating bats, for example, may fall prey to a great horned owl. But many prey animals are herbivores.

4) From what they know of a ringtail or fox's diets from their *Discovery Class*, what would the students expect the skull of a ringtail or fox to look like? (like that of the coyote)

4) Can the students think of any other carnivores? (bobcat, wolf) What would they expect the skulls of these animals to look like? (more like the mountain lion)

Extension

Have students research the skulls of additional animals and describe the animals' diets. Verify if the general skull shape and teeth types discussed above are true for these other animals. To accentuate their findings, teachers can check out the Desert Museum's *Predator/Prey Desert Discovery Kit*. This interactive, hands-on kit contains replicas of a variety of skulls, as well as teacher information, pictures, and other museum artifacts. Kits can be picked up at the museum and checked out for a two week period. Rate: $20/two weeks.

Answer Key

The deer has sharp slicing and grinding molars and no canines. This animal eats plants and is called an herbivore. Eyes on the sides of its head help this prey animal watch for predators.

The mountain lion is a meat-eater or carnivore. It has sharp, scissor-like molars to cut meat. Eyes on the front of the head help this predator watch for and catch its prey.

The coyote has strong, sharp canines. It also has scissor-like molars, with small, crushing molars behind them. This animal eats both plants and meat and is called an omnivore. Eyes on the front of the head help it to see and catch prey such as rabbits. Coyotes will also collect plant parts like mesquite beans and cactus fruit.