PREDATOR OR PREY? SKULL CHARACTERISTICS

Activity Plan – Wildlife Ecology   ACTpa033

Project Skills:
- Distinguish a mammalian predator and/or prey species using skull characteristics.

Life Skills:
- Critical thinking

Grade Levels: 5 and above

Time: 30 minutes

Supplies Needed:
- Flip chart
- Markers
- Skulls – two for each group: one predator (carnivore), one prey (herbivore). Predator suggestions are fox, bobcat, mink, or coyote; prey suggestions are rabbit, mouse, or deer.
- "Predator or Prey: Instructor Tip Sheet"

Do Ahead:
- Read "Predator or Prey: Instructor Tip Sheet" and identify skull characteristics.

Youth Leader Roles:
- Provide assistance in small groups, pointing out skull features.

Sources:
- Created by Paula Rogers Huff, 4-H Youth Development Agent, UW-Extension, Oconto County. Huff has a M.S. degree in Wildlife Ecology from Iowa State University.

BACKGROUND

Have you ever watched a squirrel as it runs across the highway in front of your car? It flattens itself down and runs in a zigzag pattern, which is great for confusing avian predators that are hunting from above. (Unfortunately for the squirrel, cars don't "hunt" like hawks).

Prey species have adaptations that help them escape from the animals that eat them. Some of them are behavioral (like the flattening squirrel) and some of them are structural (like a rabbit's big ears).

Predators also have adaptations, and those adaptations help them detect and capture their prey. One predacious species, the wolf, hunts in packs and has strong teeth and sharp claws, among other things.

Some adaptations are evident in a mammal's skull. In this lesson, 4-H project members will examine skulls to look for clues as to the mammal's role in life: was it a predator or was it prey?

WHAT TO DO

Predator –Prey Adaptations

Discuss with the group the definitions of predator and prey. Use the flattened squirrel example (see Background) to get them thinking about adaptations. Ask the group for examples of adaptations that help predators or prey survive. Then record answers to the following questions on a flip chart:

- What are some examples of adaptations that wolves have to help them catch deer?
- What are some adaptations that deer have to escape from wolves?

As a group, discuss which of the adaptations might result in a feature that could be seen in a mammal's skull.

Skull Features

Using a sample skull, point out basic landmark features and the sense and/or function to which they correspond (see "Instructor Tip Sheet"):

- Orbits (eye sockets)
- Auditory bullae (internal ear structures)
- Upper jaw
- Lower jaw
- Sites of muscle attachment for jaw
- Teeth

Predator or Prey?

Have participants work in groups of two or three. Each team should have a set of skulls to work with – one predator, one prey. Have the youth spend 10 minutes examining the skulls with their partners. Have them compare the features of the skulls, and see what clues the skulls give as to whether the animal was predator or prey.

TALK IT OVER

Reflect:
- What was it like looking at skulls?
- What kind of clues did the skulls give you?

Apply:
- In general, what did you notice about predator skulls?
- In general, what did you notice about prey skulls?
- If you were given a skull (unknown), what is the first thing that you would look at to help you decide if it was a predator skull or prey skull?
- Design the ultimate predator species. What feature "guarantees" its success?
- Now, let's think about what might help a prey species escape from that very successful predator. What adaptation could you design that would give it a chance?

ENHANCE/SIMPLIFY

Enhance for Older Youth:
- Teach the identifying characteristics of the skulls available at the workshop. Suggested Wisconsin mammals include: red fox, coyote, bobcat, cottontail rabbit and gray squirrel.

Simplify for Younger Learners:
- Concentrate on helping them learn one characteristic about predator/prey skulls. The easiest characteristic to learn (and probably the best) is eye placement. Teach them the following: "Eyes to the front – this animal hunts; eyes to the sides – this animal hides."

HELPFUL HINTS

Here are some questions if individuals or the group need some help:
- If you think this is a predator skull, how did it find its prey? Did it smell it? See it? Hear it? What do you see in the skull that would lead you to believe that?
- What do you think that this animal ate? Let's look at its teeth. What would sharp teeth like this be used for? What would flat teeth like this be good at doing?

Skull Sources:
- Check with your local wildlife officials to make sure that you understand game laws and how that affects your possession of skulls.
- Skulls and skull facsimiles are available from biological supply houses.

Skull preparation:
- If you get adventurous and want to clean your own skulls, there are two home methods to use. One is to bury the skull so that insects can clean it for you. Placing it in a wire cage before putting it in the ground is the best bet.
- The other method is to boil the jaw. This may loosen the teeth, so you may have to do some repair with glue. Soaking jaws in a weak peroxide solution will whiten them.

Juried through the Wisconsin 4-H Learning Resources Team: November 2008

Predator or Prey
Instructor Tip Sheet

Orbits (Eye Sockets)

Auditory Bullae
(underside of skull)

Nasal Passages

Teeth

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Orbits (Eye Sockets)
In general, the size of an animal's orbits is proportional to the acuity of the animal's sight.

Nasal Passages
The size of the nasal passages is related to the sense of smell. Which has a better sense of smell, a dog or a cat? Think of their facial structure and the size and shape of their nasal area. The dog has a highly developed sense of smell (and an elongated nasal passage); the cat does not (and has a shortened nasal passage).

Teeth
The size and shape of teeth give many clues to the food that an animal eats. Sharp front teeth are used for biting prey (or sometimes nipping vegetation, like a rabbit does). A deer can't do much nipping. Look at the upper jaw – it doesn't have any teeth in the front!

A wolf has a massive pair of shearing teeth (one in the top jaw, one in the bottom) that together create a strong, effective shear in the side of its mouth. You won't find those teeth in an herbivore – what you will find are flat back teeth that are used for grinding vegetation.

Auditory Bullae

This is the part of the skull that houses the internal ear structures. Again, if these are relatively large, the mammal likely has good hearing. Cats, which have a relatively poor sense of smell, have very large auditory bullae. They make up for their poor sense of smell with a great sense of hearing. That's how they find their prey. Compare the size of the auditory bullae of a cat to that of a deer. Deer hear better than you do, but not as well as the cats.

In general, when you compare the skulls of mammalian predators and prey, you can expect to find the following:

Mammalian predator skull features
- Eyes directed forward
- Sharp teeth
- Auditory bullae may be enlarged

Mammalian prey skull features
- Teeth are flattened for eating vegetation
- Eyes are located toward the side of the head

In case they ask: What about a predator that is also prey? Have the group come up with some mammals that are both predator and prey. And then here are the terms you will need to know to explain the answer to that question:
- Carnivore: eats mainly meat
- Herbivore: eats mainly vegetation
- Omnivore: eats a combination of meats and vegetation – mostly depending on what is available.

> "Eyes to the front – this animal hunts; eyes to the sides – this animal hides."
>
> Eyes located in front of head indicate binocular vision. That helps the animal judge distances – whether grabbing for tree vines, like Tarzan, or pouncing on prey, like a cat.
>
> Eyes in the side of the head mean an animal is able to see a wider view and nearly "look behind themselves." Picture a deer running from a wolf. If its eyes were in the front of its head, it would have to keep looking over its shoulder to see the wolf. With eyes on the side of its head, it is better able to see if anything is sneaking up on it.

Predators are carnivorous, which means that they capture prey and eat it. A predator is going to have adaptations that benefit it in catching its prey. A prey species may be a carnivore, an herbivore (eats vegetation) or an omnivore (eats both meat and vegetation).

Remind the youth that in this activity we are looking at predators of herbivorous prey.