ELF
Teeth and Skulls
Mitchell Elementary – October 22, 2015

Introduction

Focus: Different types of teeth are adapted to grasp, hold, and chew different kinds of food. Examining the kinds of teeth an animal has and the shape of its jaw and skull gives clues about its life and the food it eats.

Opening Questions: Why do animals have teeth? How are their teeth adapted for different uses? Why are animals’ heads shaped differently?

Tailor your classroom presentation to the age of the students. You may want to discuss some of the following concepts during your introduction. Most of these ideas also will be covered in the centers. Ask questions of the students – get them involved.

1. Do all animals eat the same food, or do different animals eat different foods?
2. If animals eat different things, do you think their teeth are the same or different?
3. Why would different kinds of food require different teeth?
4. What shape of teeth would an animal need to rip or tear meat? How about to grind grass and leaves?
5. Why do some animals have their eyes focused forward and others have their eyes to the sides of their heads?
6. Why do foxes have long, pointy snouts while bison have flat faces?

You may want to discuss briefly the different kinds of teeth (incisors, canines, premolars, and molars). For each tooth type, ask for what it might be suited. You can use the large model of human teeth from Center 1.

You might introduce how animals can be classified into four groups based on diet:

1. Carnivores eat meat and have sharp teeth; jaws move up and down only. Sharp canines are used for grabbing and holding prey, and tearing meat. Sharp molars are for cutting meat. Examples include all cats, dogs, coyotes, weasels and dolphins. Cat-like carnivores use sharp molars to slice in a scissors-like fashion, while dog-like carnivores have stabbing molars that can rip meat and crush bone.
2. Herbivores eat plants. Incisors cut plants and molars grind plants. Many herbivores don’t even have canine teeth or top incisors (they get their food by using their tongue, lips, upper gums and small lower incisors). Jaws move sideways as well as up and down to allow for chewing. Examples of herbivores include horses, elephants, porcupines, deer, and beavers. Herbivores that graze on grasses tend to have very flat teeth, while those that browse among trees have somewhat sharper molars. Gnawing herbivores, like rodents and rabbits, have continuously growing incisors.
3. Insectivores eat insects. Teeth may be sharp to catch and hold insects or peg-like to crush insects’ exoskeletons. Insectivore examples include bats, moles, armadillos and anteaters. Anteaters have no teeth (edentate) and just pull insects in with their tongues and crush them against the roof of their mouths.
4. Omnivores eat meat and plants. Omnivores use incisors to cut, canines for tearing tough food (such as meat) and molars for grinding. Examples include humans, chimpanzees, pigs, raccoons, and bears.
Teeth are adapted to aid animals in acquiring and chewing different kinds of food. We'll be looking at mammal skulls, which are mostly heterodont (having different kinds of teeth). Reptiles that have teeth are homodont (all teeth are the same). A few mammals, such as dolphins and porpoises have homodont teeth.

Do teeth have other uses than just for eating? Yes - some teeth (such as a cat’s incisors and a wallaby’s lower incisors) are used for grooming. Some animals (such as a hippopotamus) use teeth for intimidation. Many animals use teeth or tusks (enlarged canines or incisors) for fighting or defense. Walruses use their tusks to dig in the mud for food, and drag themselves out of the water, as well as for a weapon.

**SKULLS!**

In addition to animal’s teeth, each species of animal has a characteristic skull shape, molded by evolution to adapt to it's particular way of life. SO – by looking at it’s skull, we can get an idea of an animals lifestyle.

- Some skulls are lightweight with weight saving gaps (birds, bats), others are thick and strong (lion, hyenas)
- Some are long and pointed for probing and poking into holes (deer), others are short and broad (bison)
- Some eyes are on the side of the head, to keep an all-around watch for danger, this is mostly herbivores which are prey for the carnivores [ask the students to give you an example of a predator/carnivore and a prey/herbivore]
- The skulls shape and size, particularly the parts dealing with senses are a result of adaptations.
  - A meat eater hunts mostly by sight (tends to have large eyes and large, forward facing eye sockets in the skull [cats, monkeys])
  - An animal that hunts by scent develops a long snout to house the enlarged organs of smell (anteater, dog)

**You may want to use the walrus skull and the gorilla skull as you introduce this unit. They would simply be for students to look at and to get their attention and perhaps ask some thought provoking questions as you begin.**

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**Puppet Show**

This puppet show includes four animals: Two herbivores (a mouse and a rabbit), one carnivore (a weasel), and one omnivore (a raccoon). You will need 3 or 4 puppeteers. Have fun with the voices. Review animal diet classifications after the performance.

**ELF box**

- 4 puppets
- Stage
**Centers**

**Center 1: Tooth Types and Tooth Touch**

**Objectives:** To become aware of the different kinds of teeth humans and animals have and how they are used. To compare the different kinds of teeth belonging to different mammals.

**Part 1: Tooth Touch**

Ask the students to feel their own teeth with their tongues. How many different kinds of teeth do they feel? What shapes are their teeth? Have them move their jaws side-to-side. Ask them why we are built to do this? Then introduce the names of the different teeth (incisors, canines, premolars, and molars), showing them the tooth diagram and the model of human teeth.

Show the molds of human teeth and the human skull to the students and have them describe the shape of the jaw and the kinds, shape, and number of teeth. Encourage the students to feel the molds with their fingers. Have the children use their tongues (not their fingers) to find the same teeth types in their own mouths. Parent volunteers might bring in hand mirrors to help the children examine and identify their own teeth.

Together list some of the foods humans eat and some ways we prepare our food to make it easier for us to eat. Point out that humans are omnivores, eating a variety of foods. Like most omnivores, humans have a variety of teeth (incisors, canines, premolars and molars) to serve different purposes. Show them the human skull and let them examine the teeth. They can compare it to the teeth they find in their own mouth. Adult humans have 32 teeth (including wisdom teeth) while most of the students will find they have between 20-26 teeth.

Give each child some different kinds of food to eat (e.g., crackers, fruit leather). What actions do the different teeth perform in eating? How do the students use their incisors? Their canines? Their premolars and molars? They should find that they bite crackers with their incisors. They tear fruit leather with their canines. Canines are their strongest teeth and have the longest roots. The molars chew and grind. Have the students hold their hands on their cheeks and jaws while they chew. What moves when they chew? How does their tongue move when they bite, chew, and swallow? How would eating the snacks be harder without canines? Incisors? Molars?

**Part 2: Tooth Types**

Show the students the labeled drawings of herbivore, carnivore, omnivore, and insectivore skulls with teeth. Discuss the kinds of teeth (incisors, canines, and molars). Why do some animals have large incisors? Why do some animals lack canines, while others have large canines? Why do some animals have sharp, pointy molars, while others have flat molars? What foods does each animal eat? How are each animal’s teeth adapted to its diet?
Show the students the deer skull and deer mandibles. **Please set each deer mandible on the packing material provided and ask the students to handle them gently, only over the packing material, as they are quite fragile.** You may want to use only a couple of mandibles for the group to examine together (to monitor handling). Explain to the students that the lower jaw is called the “mandible”, and it is the only bone in the skull that humans or other mammals can move independently. Ask them for observations about the deer mandible. How are the teeth there similar or different from the teeth in the human jaw? Why doesn’t the deer have any canines? As an herbivore, it does not need sharp teeth for stabbing or ripping. The deer’s six lower incisors allow it to snip grass, leaves and boughs, while its flat molars serve to grind up the vegetation as it chews.

If you have time, you might discuss the different skull shapes of the human, deer and animals in the diagrams, looking at eye placement and head shape. For example, why is the deer’s snout somewhat extended and its eyes far up and to the side of its head? The long snout allows the deer to reach and browse. The distance between the mouth and the high, side-facing eyes allows the deer to watch all around for predators as it eats. Discuss how those features help the animals survive.
Center 2: “What’s For Dinner?”

Objectives: To show the relationship between animals’ teeth/skulls and the foods they eat. To focus students on the major classes of animal diet types (carnivore, herbivore, omnivore, and insectivore) for more information look at front page of this outline in intro.

Set Up: Please keep packing material with the corresponding skull (set the skull on top of it, so the skull won’t bang on the hard desktop).

It is strongly recommended to only pull out one skull at a time so that the students focus on the skull and that the volunteer can keep the skull protected from too much handling.

Omnivore: Raccoon (PB-3548) large canines, cutting carnassials, flattened molars.

Carnivore: Red Fox (PB-0549) canines for grabbing and holding, sharp by slightly flattened molars for tearing and crunching bone, long nose for pronounced sense of smell, forward facing eye sockets to aid in hunting.

Insectivore: Armadillo (PB-0258) small, flat peg shaped molars to crush insects, no canines or incisors, long skull provides casing for long tongue.

Herbivore: Jackrabbit (PB-2365) double set of two incisors, extra strong for gnawing, no canines, flat molars, eye sockets on sides of skull.

Alternatively, use a book like Animal Fact File or the DeLoy Roberts’ website binder to show students the skull/teeth of the specific animals.

Choose and Classify: Give each student a “restaurant order card” activity sheet and allow each to select an photo/animal card. The photos have each animal listed as well as an H, C, O or I representing herbivore, carnivore, omnivore, insectivore. Students can look at their photo to an animal’s skull. For younger students, you might share with them some of the foods the animal eats (e.g., leaves, seeds, berries) and ask them to tell you the scientific word that fits that diet (i.e., herbivore). Use the Diet Type List as your guide to help students classify the animal on their card Use the Animal Diet Type Chart as an aid – this chart lists the animals alphabetically and provides some sample food they eat. For older students, you might want to be more open-ended, let them observe the teeth shape, and then ask them what sorts of foods might fit with this dentition. Next, ask them to classify the diet type. You might also focus on how other skull features relate the animal’s diet (e.g., front-facing eye sockets for carnivores that hunt, and side-facing eyes for animals that are vulnerable as prey).

Create Menus: Once each student has classified their animal by diet type, ask them to use items from or like those on the “Menu” poster to plan a fanciful meal for their animal. Encourage them to select an appetizer, main course, side dish, dessert and drink appropriate to the animal’s diet type. Younger students can draw their menu selections and name them verbally. Older students can write full sentences to describe their choices. You can foster creativity by encouraging students to dream up their own menu items, instead of sticking just with the items on the sample menus. As they invent their own choices, help students to be certain the food item fits with the animal’s diet type (e.g., they wouldn’t want to serve a deer any “marinated muskrat medallions”).

Share Work: Once menus are complete, if time permits, ask each student to share their animal and menu with the others (e.g., “my animal is a wild horse. He is an herbivore and grazes on grasses. So, he chose “clover crepes” to begin, followed by a “stewed straw” main course, a side dish of “baked bluegrass”, and, “glazed grass medley” for dessert”). Ask the students to

ELF Center 2 Bin
- Animal cards
- Blank “restaurant order card” activity sheet
- Diet Type List (herbivores, carnivores, etc.)
- Animal Diet Type Chart (list of animals and sample foods they eat)
- Menus
- “Skullduggery Among the Mammals” sheet
- DeLoy Roberts’ website binder
- Animal Fact File book

Classroom
- Pencils, Markers, Crayons

Please caution students not to destroy the packing material (no matter how fun it is to “pop” bubble wrap).
describe how the menu and the animal’s teeth are related (e.g., “the wild horse, like other grazing herbivores, has strong, flat molars for grinding grasses”).

The students may take their order forms home – so be sure to have them put their name on it! The Volunteer should collect all the creations and give them to the teacher at the end of ELF to send home in the Friday Folders.

**Center 3: Skull Study**

**Objective:** To examine, compare and contrast animal skulls and teeth and to relate to animal diet types.

There are a variety of sample skulls for use in this center. This center is one that could use MORE than one parent volunteer. The majority are on loan to ELF from the Denver Museum of Nature and Science. Each skull is packaged in a ziplock bag with packing material, with the skull name, ID# from DMNS and a color coded key for diet type. Please take EXTREME care in handling each skull, as some have separate upper and lower pieces. If a skull becomes damaged in any way, contact Emmy Dimitroff (fishingyaak@aol.com) immediately and save all of the pieces as the DMNS may be able to repair the item. Our goal is to return the items the way we received them.

**Background Information on Skulls from DMNS**

**Omnivores (Key: Brown)**
1. Human (PB-0274) incisors to bite, small canines to tear, flat molars to grind.
2. Snapping turtle: strong beak instead of teeth, edges of the jaws have sharp edges to rip apart food
3. Wild Pig: large canines for tearing food

**Carnivores (Key: Blue)**
1. Walrus Skull and Tusks (PB- ) tusks are elongated canines and can reach as long as 3 feet and weigh up to 12 pounds. The teeth are highly variable, and they generally have few teeth other than tusks. They use their tusks to dig in the mud for food, and drag themselves out of the water, as well as for a weapon.
2. Bobcat: sharp canines, can slice through flesh
3. Polar Bear: canines for tearing; broad, flat molars to grind leaves and roots. Large skull has plenty of bone to anchor strong jaw muscles.

**Insectivores (Key: Pink)**
1. Anteater (PB-1786) no teeth (edentate), they just pull insects with their tongues and crush them against the roof of their mouths.
2. Little Brown Bat (PB-4429) in clear plastic case. Many sharp teeth to grab and hold insects.

- Skull samples from three large green storage bins in ELF Closet, along with regular Center 3 bin.

**ELF Center 3 Bin:**
- Note cards for ID “mystery” skulls
- Hand Lenses
- “Skullduggery Among the Mammals” Guide
- Optional Skull Investigation worksheets (advanced and basic)
- Color, laminated handouts from *Animal Fact File* book
- DeLoy Roberts’ website binder

**Classroom**
- Pencils
- Dry erase markers
- Hand sanitizer

PLEASE HAVE STUDENTS USE HAND SANITIZER BEFORE THEY MOVE TO THE NEXT CENTER
Herbivores (Key: Green)
1. Roe Deer (PB-1784) European species with antlers, flat molars to grind grass, no canines, lower incisors only.
2. Beaver (PB-1788) no canines, flat molars. They have specialized jaws that they can throw forward to gnaw on trees then throw jaw back to chew food. Jaws also move side to side. Incisors grow continuously.

Set Up: Before beginning the center, examine the sample animal skulls and choose a variety of skulls—a minimum of one skull from each diet type. Lay the skulls out, or place them in a handy location next to you (such as a table—not the floor), and bring them out one at a time so that the students will focus on each skull. Keep each skull with its corresponding packing material, place the packing insulation or small box lid on some, down as a platform for the skull. You may want to group same diet types of skulls together (See color coded key). Give each student a hand lens. Plan on discussing or having the students fill out the optional Skull Study worksheet for the group for each skull. First review with the students the appropriate way to handle a skull – gently, with care, using two hands, and holding it right over the desk top, so it does not crash to the floor. We also suggest a two finger touch rule.

Try to familiarize students with at least one skull for each animal type (carnivore, herbivore, insectivore and omnivore), for a minimum of four skulls per rotation. Let students handle the skulls appropriately and observe details with hand lenses. Some have labels from DMNS that we cannot take off. You may want to assign numbers to the “mystery” skulls on the provided note cards and, for each, write on the board a list of possible animal identities. For K-1, the choices should be fairly distinct (Skull 1: bear, bat, jack rabbit, porpoise). For 2nd grade and above, the choices might be more subtle (Skull 1: bear, horse, deer, hyena), or perhaps give eight to ten choices. Students may use the laminated photos/information sheets from Animal Fact File book of the animals to help students narrow the choices and identify the skulls.

As work proceeds, focus the students on how each skull differs from the prior skulls. Record detailed observations on the optional Skull Study worksheets or simply discuss. After they observe skulls of each animal type, ask students to think about which ones had the fewest teeth? The most kinds of teeth? Help them generalize and distinguish among teeth types and skull features of various animals. If time permits, as a group you can examine some other skulls that have interesting characteristics. Try to expose students to as many skulls as they can readily examine during this center.

Clean-up:

Please return all skulls on loan in packing material as carefully as possible in the appropriate ziplock bag.

Place heavy skulls at the bottom of the green storage bins, and lighter, more fragile skulls near the top of the green storage bins.
**Center 4: Complete a Jaw**

**Objective:** To design a set of teeth that are adapted to fit a particular animal's diet.

Before beginning, review the “Skullduggery Among the Mammals” sheet and/or the skull diagrams with the students. If this is their first or second rotation, you may need to cover a fair amount of detail.

You can also show them the shark jaw and horse or false killer whale mandible (and the elephant molar or horse molar). Ask for observations and show them the difference among the teeth. The shark’s jaw is “homodont” with all teeth in it of similar shape. The herbivore horse is more “heterodont”, having different shaped teeth (incisors, canines and molars.) The shark is an obligate carnivore, with every tooth sharp and pointy to capture its prey. With no molars, the shark does not chew the chunks of meat that its knife-like teeth rip off (snakes likewise have homodont teeth, as do many insectivores, like the shrew and the armadillo). The shark also is adapted to replace its teeth, with supplemental rows recessed into its jaw. Mammals are not so adapted, and must proceed through adult life with no natural ability to replace lost teeth. Rodents and some related animals, however, have large incisors for gnawing that grow continuously throughout their lives (rabbits, beavers, mice).

The students will choose an animal and create a jaw full of teeth. Have the students determine what foods their animal eats and then design teeth that are adapted for eating these foods. Encourage the students to include different kinds of teeth (incisors, canines, molars) in the appropriate positions. The animal can be real or imaginary, as long as they can explain the function of the teeth. This craft offers a movable jaw and will require preparation by the volunteers before class. Volunteers need to pre-cut the cardstock jaws (one per student) for K – 1. Have the students decide what foods their animal eats and draw teeth adapted for these foods. Then have the students cut out around the teeth (or you can do it). Punch a hole where shown and attach the upper and lower jaws using the brad fasteners provided.

When the students have finished their teeth, have them share their animal with the rest of the group. Use the “Animal Sharing Guide” to help students share their animal with the rest of the group.

The students may take their jaws home – so be sure to have them put their name on it! The Volunteer should collect all the creations and give them to the teacher at the end of ELF to send home in the Friday Folders.

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**ELF Center 4 Bin**
- “Skullduggery Among the Mammals” sheet
- Skull diagrams
- False Killer Whale mandible
- Elephant molar
- Horse molar
- Animal Sharing Guide
- Cardstock skull templates
- Brad Fasteners

**Classroom**
- Pencils, crayons, markers, scissors
Wrap-up

Options

- Write the four diet types on the board and ask students for items they learned about the teeth and skulls of each animal type. List the students’ ideas under each type.
- Read a book such as *The Tooth Book (Dr. Seuss)*, *A Look at Teeth*, or *Look at Teeth and Tusks*.
- A more interactive and challenging book for closing would be *The Skull Alphabet Book* by Massiello.
- Sharing circle: Have each child choose an animal and fill in the sentence: “I have _______ teeth (describe teeth) and I eat ________.
- Using *The Skull Alphabet Book* as described at ELF Training. This supplementary conclusion will be suitable for grades 2-4 and, at your discretion, may utilize selected skull samples.

Books in ELF Bins

*Animal Fact File (Dr. Tony Hare)* -book in Center 2, laminated color copied sheets in Center 3.
*Teeth that Stab and Grind* (Diane Swanson) –Center 4.
*A Look at Teeth* (Allan Fowler) -Center 1.
*Teeth and Tusks* (Theresa Greenway) –Center 1.
*The Tooth Book (Dr. Seuss)* –Intro/Conclusion
*Skeleton* (Parker) – Center 3
*The Skull Alphabet Book (Masiello)* –Conclusion
*Throw Your Tooth on the Roof* (Beeler) – Intro/Conclusion
*Teeth* (Sneed B. Collard) –Center 1

Materials

For your classroom session you will need:
1. One ELF Intro/Conclusion Bin
2. One Center 1 Bin (human skull, deer skull and deer mandibles)
3. One Center 2 Bin
4. One Center 3 Bin
5. Two medium size blue DMNS bins full of SKULLS! Two smaller bins with skulls. One science cart with three skulls.
6. One Center 4 Bin
7. Puppet stage

**PLEASE USE EXTRA CARE IN HANDLING AND REPACKING ALL SAMPLE SKULLS AND TEETH. MATERIALS ARE FRAGILE AND THE MAJORITY ARE BORROWED.**

**PLEASE WRAP EACH SKULL SEPARATELY IN PACKING MATERIAL PROVIDED. PLACE SMALL SKULLS ON TOP OF LARGER SKULLS IN BIN. IF ANY SAMPLE GETS DAMAGED OR BROKEN, PLEASE ALERT AN ELF COORDINATOR IMMEDIATELY.**