Mississippi Valley Archaeology Center
1725 State Street
La Crosse, Wisconsin 54601
Phone: 608-785-6473
Web site: http://www.uwlax.edu/mvac/

The following lessons were created by Judy Cloues, a teacher participating in a National Endowment for the Humanities Summer Institute for Teachers entitled Touch the Past: Archaeology of the Upper Mississippi River Region.

Title: What can we learn from bones?
Adaptable for use in grades 2 and up
Duration: adjust as necessary depending on the age of students

Overview: This lesson will provide students with a chance to observe a lab process through photos and listening to an account of animal processing in an archaeology lab. They will be able to see and handle the processed bones and try to identify them as to form and function by comparing them to a diagram of a fully assembled and labeled skeleton. Through brainstorming in small groups they will relate what they observe to their study of early people whose main source of animal products was the white tail deer. Their "lab" and tools were different, but their problem was the same: they needed to process the animal to get at the stuff they could use.

Objectives:
-To observe how archaeologists of today process animal bones for study in a lab.
-To learn what archaeologists can find out about animals by studying their bones.
-To gain an understanding of how early people may have processed their "kills".
-To make connections between the ways that early people processed the animals that they hunted and what products they could have gained from them.

Skills and Strategies: observation, listening, categorizing, analysis, brainstorming, cooperation, discussion, making connections with prior knowledge, creative thinking, writing and/or drawing, oral sharing of ideas.

Vocabulary: process, skeleton, function, calcium, vertebrate, compact bone, cartilage, spongy bone, epiphyses, joint, marrow, muscles, tendons, ligaments, fused. (Some or all of these may be used when doing the various activities. Adjust as needed for your students.)

Materials: Discover Bones, by Lesley Grant (optional). collection of photos showing the steps of bone processing in the archaeology lab; processed animal bones (for this lesson a dog skeleton was found, but other small animals could be used); labeled dog skeleton(or other animal) sheet; labeled human skeleton sheet; large drawing paper or poster sheet for each group; writing paper; drawing and writing tools.

Setting the stage: Part I Processing animal bones in a lab

Read aloud to students pages 10 and 11, "Feel Your Bones" and "Dogs and their Bones", pages 54 – 55, of the book Discover Bones, by Lesley Grant. If this book is not available, discuss with students the nature of their skeletons and how their various bones do different things for their bodies. Have students feel their bones in different parts of their bodies including an arm, leg, ribs, spine, fingers, skull, etc. to allow them to discuss and appreciate the differences in form and function.

Procedures:

- Relate to the students the story of how the dog's bones were found and why they were collected.
- Show the series of pictures of the processing of the bones in the lab as you describe the process. Be sure to point out the tools and materials that were used for each step. Answer student's questions as you go along. When finished, mix up the photos and see if the students can retell the process and put the photos in order. (See accompanying sheet for steps of bone processing.)
- Ask students what they think could be learned by processing the dog's bones. Tell them what was learned and how you know. For example, I know the dog was young because the ends of the long bones, or the epiphyses (also called growth points), were not fused to the main bone. I can also tell about its age by looking at its teeth to see how worn they look and whether or not they are permanent teeth.
- If real bones or replicas are available, bring them out at this time. Explain that the bones should be handled with care and respect. Divide the students into two small groups. Give each group a copy of the labeled dog skeleton sheet and the human skeleton sheet.
- While one group is working with the bones, have the other group comparing the dog skeleton sheet to the human skeleton sheet to notice similarities between the two. Each group should make a list of similarities.
- The group working with the bones will try to identify them by looking at the dog skeleton sheet that is labeled. As they work, have them tell what they think the function of the bone was and give their reasons. After a suitable time, have the groups switch places and proceed with the activities.

- Bring students together and have groups share their ideas about the ways that the dog and human skeleton are similar, as well as what they learned about bones.
- Have a short writing session for students to write about the bones experience in their journals. This can be done at a later time.

Setting the stage: **Part II Processing a deer in Archaic times**

With the whole group together, tell the students that they will now take a trip back in time to the prehistoric time known as the Archaic period, which they have learned about in previous weeks. Have them brainstorm their thoughts about the lifeways of the people who lived then. (They are still living in small, nomadic bands that hunted and gathered their food; one big change is that the large animals of the Paleo period have disappeared and the most abundant animal to hunt now is the white tail deer; the hunting is now done with an atlatl).

Procedures

- After the brainstorming session, tell students that they will now pretend they live in a band of people and a member of the band has just returned from the hunt with a deer. In their bands (small groups) they are to talk about how the deer will be processed to make it usable and what products they think they will get from the deer.
- Give each band a large sheet of paper which has been divided into two sections: one side is to show processing steps and the other side is to show what products can be made from the deer parts. Give groups time to complete their charts.

Closure:

When all charts are finished, bring the class together to share their ideas and to tell about their charts. On a separate sheet or on the board, keep a running list of products the students came up with. It may interest them to have you share with them the accompanying list of products from a deer leg. Have students discuss the ways that prehistoric bone processing would have been different than modern techniques, as well as noticing the ways in which the processing is similar.

Evaluation:

Since this lesson is activity based, the teacher's assessment of students' learning will be based on observations of participation during the whole-class discussions, small group activities and the oral presentations of the group posters, as well as teacher interaction with students during these times. Follow-up journal entries by individual students and/or interviews with them will provide additional ways to evaluate what was learned.

Extensions:

Students who are interested may wish to read more of the selections in the book, Discover Bones, by Lesley Grant.

For interested students, **making bone tools** is an activity that gives them a closer connection to the early people. Turkey leg and wing bones are easily obtained and can be worked into **awls and drills**. Once the bones have been processed, and adult can score a long bone with a stone flake or a knife, and then gently hit it with a rock or a hammer to split it. (wear eye protection for these steps) Select a piece that can be sharpened to a point. Scraping on stone or concrete will sharpen the end.

Once bone awls are completed and sharpened, they can be used to make a **simple leather pouch**. Simply cut a circle with a diameter of 8 – 10 inches from a piece of pigskin or other leather (not too thick). Using ink or colored pencil in a color that will show, make a series of dots around the perimeter of the circle, one-half inch in from the edge. Space them about ½ to ¾ inch apart. Make sure there is an even number of dots. Use the bone awl to make a hole at each dot. This should be done on a soft surface, like an old magazine or carpet. Hold the awl straight up and down and exert pressure in a downward direction while twisting the awl like a drill. When the point goes through the leather, turn it over and push the awl through the hole, being careful not to make the hole too big. When all holes have been made, cut a piece of cord or sinew that is long enough to encircle your head with extra allowed for tying, and thread it in and out of the holes all around the circle. When you get back to the start, hold the ends together and draw up the fabric into a pouch. Tie the ends of the cord or thread them through pony beads to add decoration.

Some students may wish to **process a small animal** themselves following the steps shown in the lesson. This can be done by using a chicken, a rabbit or other small animal purchased whole at a farmers' market or butcher shop. They may then use the bones to make other bone tools or they may want to try reconstructing the skeleton. Depending on their ages, students may need to have adult supervision for parts of or all of these activities.

Further Reading: Books for Kids

Animal Skeletons, by Judith Janda Presnall

Skeleton, (Eyewitness Books Series) by Steve Parker, Philip Dowell (illustrator)

The Skeleton Inside You, by Phillip Balestrino, True Kelley

Drop of Blood, by Paul Showers, Edward Miller

Human Body, by Steve Parker

The Ultimate Book of Bones, by Jinny Johnson, Elizabeth Gray(illustrator),Steve Kirk

(illustrator)

Teacher Resource: Primitive Technology - A Book of Earth Skills
By David Wescott

Resources:

For replicas of bones and skulls: www.skullsunlimited.com

For books of animal skeletons, bone identification, etc.
www.skullsunlimited.com/books.htm

For lesson plans, replicas, books: www.skullduggerry.com

What information can animal bones provide about early people?

- what early people ate and how healthy they were
- the types of animal resources that were available at the time
- what animals were hunted and how
- methods of hunting, butchering and processing
- what season the people lived in an area
- what the environment was like at the time
- the ways in which bone, antlers and shell were used as tools
- what animal products may have been traded and where they came from
- data for bone chemistry analysis (for example: differences in regional diets where people ate different foods)

Vocabulary Words:

Calcium	an essential element for building strong bones and teeth
Cartilage	a smooth, flexible material found mainly on joint surfaces in the nose, ears, and windpipe. In newborns, almost all bones are cartilage.
Compact bone	the hard, dense outer layer of bone
Epiphyses	the growing ends of bones
Function	the way something is used
Invertebrate	an animal without a backbone
Joint	a place where bones meet
Ligaments	short bands of strong, flexible tissue that connect bones together
Marrow	a soft, fatty substance found in bones. Red marrow makes blood cells. Yellow marrow stores fat.
Muscles	tissues that can expand and contract to allow your body to move
Skeleton	a strong, hard framework that supports a body
Spongy bone	the light but strong mesh-like bone that is inside bones
Tendons	cords of strong tissue that connect bones to muscles
Vertebrate	an animal with a backbone

How Many Things Can Be Made From A Deer Leg?

Buttons
Awl case
Knife sheath
Musical rasp
Hair pins
Bow grip
Gorge hook
Pouch
Wood wedge and chisel
Toe bone fish hook
Bone knife
Sinew
Knife handle
Root digger
Needle case
Hide flesher
Hoof rattles
Gaming dice
Earrings
Ring
Tweezers
Pendants
Glue
Cordage
Scraper
Bow drill and extension
Pins
Awl
Needles
Fire socket

From Primitive Technology – A Book Of Earth Skills
Edited by David Wescott
"From the Leg of a Deer", by Roy H. Brown pages 68 - 69

Steps for processing Animal Bones

- Since the dog remains had very little fur and no flesh*, we began by boiling the bones in water with “Biz” detergent added. Use approx. ¼ cup per gallon of water.
- Place bones in the pot with the detergent and water and place on stove burner, preferably inside a fume hood to control odors. Cover pot and bring to a boil on high heat.
- When the water is boiling, reduce the temperature but keep the water simmering. Simmer bones for about two hours.
- After boiling, strain off the liquid by pouring the water into a strainer placed in a deep sink. Keep the water running in the sink to allow small particles to wash down the drain.
- When the bones are cooled enough to handle, carefully remove them from the pot and begin the cleaning process.
- To clean the bones, use a dishpan full of lukewarm water with a teaspoon of “Biz” dissolved in it.
- Carefully clean each bone with a toothbrush to remove dirt and remaining tissue. For stubborn tissue connections, use small scissors.
- After cleaning, lay the bones on a tray covered with paper towels and allow them to dry for several days or longer.
- Strain the dishpan to catch tiny bones that may have fallen to the bottom.
- If, after the drying time, some bones still have grease stains that must be removed, a second boiling may be done, but it should be for a shorter time and kept to a low simmer to avoid over-softening the bones.