



Theme

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ANCIENT SUBSISTENCE

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LESSON 4A—NARRATIVE: WHAT PLANTS DID ANCIENT PEOPLE USE?

Roots, berries, bulbs, and other parts of plants provided food and medicine for ancient people.

When hunger strikes, you simply open the refrigerator door, or cupboard, and take out food to eat. Your parents prepare meals from food they buy at the grocery store. Some Montana families choose to grow gardens for fresh produce, or they hunt game animals. Maybe your family drives to a local restaurant for a meal. Ancient Montanans did not have all the choices we have today. They did not rely on grocery stores or restaurants for **subsistence**. They depended on plant foods they gathered and animals they hunted in the wild.

Prehistoric Montanans did not plant gardens or raise animals for food. But many ancient people living in other parts of the New World did. By the time Europeans arrived in the New World, most Indians living in the east and southwest were **agriculturalists** who cultivated plants, including over three hundred different food crops. Foods introduced to the world by American Indians include potatoes, tomatoes, squash, beans, corn, peanuts, cashews, blueberries, and maple syrup. The plant foods first domesticated by Indians feed much of the world today.

Prehistoric people in Montana were **hunters and gatherers**. They were not agriculturists. They were also **nomadic**, moving as the seasons changed to hunt and gather wild food in different places. A variety of plants grew through the warm seasons.

Animals moved as plants were available for their subsistence. People lived along the warmer river bottoms during the cold weather. They traveled to the foothills and mountains during warm weather to hunt animals and gather roots, bulbs, and berries. This was their **yearly subsistence round**.

Traveling to gather plants and hunt animals was their way of life. Living a nomadic lifestyle meant traveling light and carrying few possessions. For the majority of prehistoric time, people did not have horses to transport their personal items. Dogs hauled belongings for ancient people on a **travois**. They carried only the necessities. They could not carry a great supply of food. Gathering plants and hunting animals was a constant and necessary activity of all prehistoric groups in Montana.

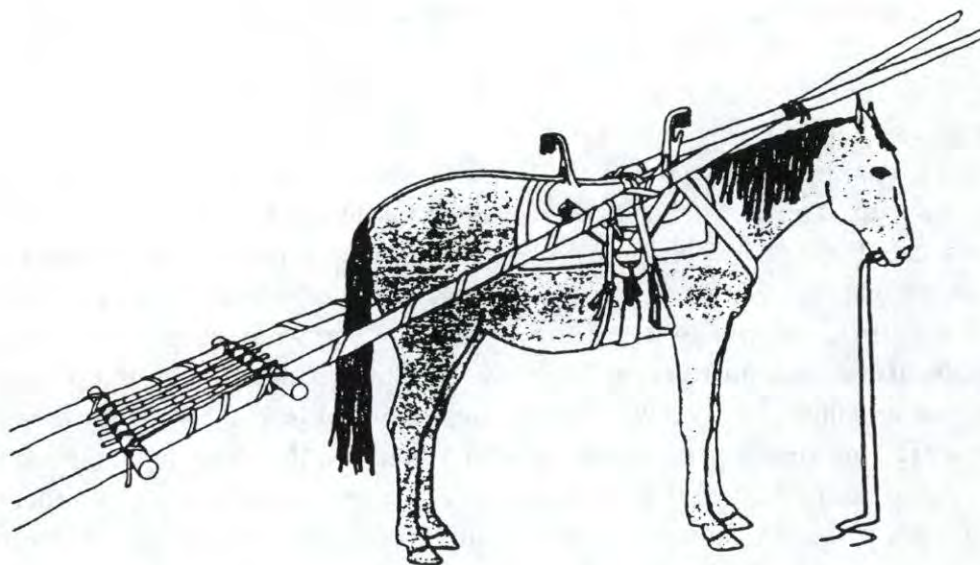
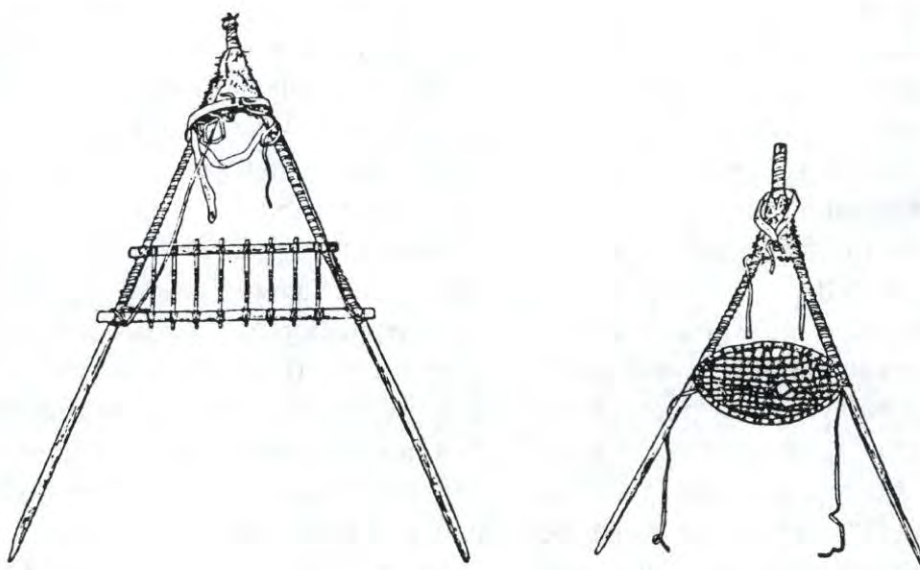
All people need food and water to survive. Each person needs a certain number of **calories**, or food energy, to stay alive. The number of calories each person needs varies depending on a variety of factors. A person's age, body size, and activity level create the need for different amounts of calories. Young people require more calories than an older person does, as young bodies are growing. People who live in cold climates also require more calories than those living in warm areas. In Montana's rigorous climate, people needed many calories of food to survive. Prehistoric groups did not have the technology to store large

quantities of food. When food—particularly bison—was plentiful, times were good. But each year in late winter and early spring, prehistoric groups often went hungry. They might eat a meal every couple of days. A meal might be a little camas flour mixed with water and pieces of boiled bison hide. Stored plant food often got them through these tough times.

In ancient times, the kinds and availability of plants varied from

eastern to western Montana, from lowlands to high mountains, and from spring through summer to fall. Many plants that grew in Montana during prehistoric times, such as camas and bitterroot, are similar to the same plants today. People used the plants that grew in their territory because they knew where and when to find them. Spring and summer were seasons to gather plant roots and bulbs. Late summer and autumn were

Montana's ancient people used the travois to move their food, shelter, and other belongings from place to place. Before Euro-Americans introduced horses, the travois was harnessed to dogs. *Courtesy Kansas State Historical Society.*



times to harvest nuts and berries.

People did not just use plants for food. Some plants were of great medicinal value. **Medicines** made from plants cured ills and healed wounds. In fact, the soft drink, Dr. Pepper, got its start as a traditional medicinal tonic made from peppery-tasting roots and bark. Prehistoric people placed purple coneflower on rattlesnake bites and other venomous stings. They used the leaves of the balsamroot plant as a **poultice**, a moist covering, for burns, cuts, and bruises. Tea, made from the stem or bark root of a wild rose, helped cure stomach problems. They used yarrow on cuts to help stop bleeding. They also boiled yarrow and used it to wash and disinfect wounds. The Flathead Indians used the huckleberry plant for heart ailments and arthritis.

Plants could also help people manufacture useful items. Prehistoric people used milkweed and juniper to make **cordage**, a braided form of ancient string. A nine-thousand-year-old net made of juniper bark cordage was found in Mummy Cave near the Montana/Wyoming border. The net was used to trap animals.

Plants were very important to ancient people. It is estimated that over three hundred different species of plants were used by the prehistoric people of Montana. However, until recently, archaeologists often ignored this important facet of prehistoric life. This is because direct evidence of plant gathering and processing has been difficult to find in Montana archaeological sites, where plant remains often do not survive over time. Now, new methods of analysis

have enabled archaeologists to better study this activity. Before this new knowledge became available, oral histories and early written descriptions of plants used by historic Indian tribes helped archaeologists understand how prehistoric people probably used plants. And today, many tribal members still gather plants in special areas. They process and use them in the ancient way as food or medicine. The study of modern traditional plant use is called **ethnobotany**.

Roots were a primary plant food source for prehistoric people. Root crops such as camas, bitterroot, biscuitroot, and Indian breadroot provided them with nutrients, minerals, and vitamins, as well as **carbohydrates** and **protein**. Root harvesting was women's and girls' work among the Salish, Flathead, Blackfeet, and Shoshone Indians. They used a special **digging stick**, made of wood and/or antler. They harvested the roots at certain times in spring when they were most edible. Bitterroot was harvested before it flowered; camas was harvested after it flowered. Through knowledge passed on by elders, ancient people knew when roots were at their prime. This traditional knowledge continues to be passed on today.

Once a root was dug, it could be **processed**, or prepared, in many different ways. Some roots were dried in the sun by spreading them out on animal hides. These were saved for winter meals. People also boiled and steamed roots, or roasted them in pits dug into the ground. Roots could be eaten plain, mixed with berries, or added to stews as a thickener.

Camas, a very popular root crop among the prehistoric people of western Montana, was stored whole, squeezed into little cakes, or mashed and formed into round loaves. Camas was also boiled to make a sweet-tasting drink much like coffee or tea. Before sugar was introduced, dried camas was the primary sweetening agent used by many Indian groups in the Pacific Northwest.

Often prehistoric people dried the roots and then mashed and ground them with a stone **mano** and **metate** to create flour. This flour was then used in cooking. A metate is a large flat stone with an indented area to place roots. The mano is a smaller hand-held stone used to mash and grind the root back and forth within the metate's indented area until the root is finely ground. Prehistoric manos and metates show the wear of many years of use.

Berries and fruit were a staple in many prehistoric diets, especially during the fall. The people harvested serviceberry, huckleberry, chokecherry, gooseberry, currant, and buffaloberry as they ripened in late summer or early autumn. The berries harvested after the first frost are considered the sweetest by many today. Berries and fruit were eaten fresh, dried in the sun on hides, or ground with a mano and metate. Ground berries and fruit were mixed with fat and meat, then formed into cakes and loaves. Lewis and Clark wrote in their journals that they saw Indian women making serviceberry cakes that weighed fifteen pounds! Prehistoric people dried a mixture of berries and/or fruit, meat, and fat to create **pemmican**. Pemmican could be

stored to eat during the winter months or packed along on journeys.

Other parts of edible plants these early people consumed included the seeds of yucca, pigweed, wild sunflower, and wild rye and the nuts of limber and whitebark pine. They also ate the leaves and fruit of the prickly pear cactus. Prehistoric gatherers collected the bulbs of sego lily and wild onion, and in the spring, they ate the early shoots of the arrowleaf plant like celery.

Many of the plants you see when you hike through the prairies or mountains provided food and medicines for ancient people. Plants were extremely important for survival, especially when prehistoric hunters could find no animals to kill. Today many American Indians, and others, use plants as the ancient people did. Tribes such as the Blackfeet, Salish, and Kootenai Indians still use traditional huckleberry and bitterroot gathering grounds each year.

It is always important to identify plants before you eat or use them. Some plants like the water hemlock are deadly poisonous, so please exercise caution.

LESSON 4A—VOCABULARY: WHAT PLANTS DID ANCIENT PEOPLE USE?

agriculturalist _____

calories _____

carbohydrates _____

cordage _____

digging stick _____

ethnobotany _____

hunters and gatherers _____

mano _____

medicines _____

metate _____

nomadic _____

pemmican _____

poultice _____

processed _____

protein _____

subsistence _____

travois _____

yearly subsistence round _____

LESSON 4A—ARCH ACTIVITY: SURVIVING THE WILDS

Grades: 3–8

Content Area: science, history, and writing

Who: whole class and individual

Materials:

paper and pencils

Arch Journal

OBJECTIVE AND OUTCOME

- Students will gain an understanding of how ancient people used the natural environment as their grocery store.
- Students will identify plants and animals in their local area that could be used for food and clothing.
- Students will create a chart comparing subsistence elements of our culture with those in prehistory.

ACTIVITY

1. Tell students to imagine that one day they wake in the wild next to a river. After they find themselves there, they look around and find no other people. There are no roads, stores, buildings, or other sign of civilization. All they have is a book for identifying plants. In order to survive, they will need food, tools, and shelter. They must rely on nature to provide for their needs.

2. Discuss what their needs would be and how they would do things. List all ideas on blackboard.

~ Ask students what their first concerns would be?

~ Ask students about what animals and plants would be available for them to eat? How would they gather plants? How would they hunt?

~ What tools would they need for hunting and plant gathering?

~ How would they cook food? What would they need to cook it?

~ If they need to store food, how would they do it?

~ How would the river be important for their survival?

~ Would it be easier to survive in a desert than in Montana? What advantages would a desert environment offer?

~ How much time in a day would survival activities take? When would there be play time?

~ In summary, what special skills would students need to develop to survive in the wild and what would their lives be like?

3. Instruct each student to make a chart in their Arch Journal with six comparisons of our food today with that of prehistoric people.

EXTENSIONS

3–5:

- Research vocabulary.

See: Lesson 4A—Vocabulary.

6–8:

- Challenge students to read about the domestication of plants and find out which domesticated plants came from which continents. Examine the world map and show where plants came from.

LESSON 4B—NARRATIVE: WHAT ANIMALS DID ANCIENT PEOPLE EAT, AND HOW DID THEY HUNT THEIR PREY?

Ancient people hunted prehistoric and modern-day bison, elk, deer, and other animals with a variety of techniques.

Today many Montana families choose to hunt big game and game birds for food. Ancient Montanans did not have a choice. They depended on the animals they hunted for protein, a nutrient all humans need to maintain health. For men and boys, hunting was a constant, daily activity. Some women also hunted.

When people first arrived in Montana, at least twelve thousand years ago, they hunted the Ice Age **bison** (or buffalo), **mastodons**, and **woolly mammoths**. These huge animals are now extinct. Ancient people hunted and killed these large animals with hand-held **spears**. They chased many into gullies and spring bottoms, where the great beasts became mired in mud and muck. Then prehistoric people—working as a group—were able to kill their giant prey in these confined spaces. Hunting this way was very dangerous because the hunters had to get in close proximity to their prey in order to thrust their spears into vulnerable areas like the lung cavity. These hunts involved much planning, preparation, and primitive magic.

About nine thousand years ago, prehistoric hunters began using the **atlatl**, or spear thrower, to propel a long, slender, stone-tipped dart. The atlatl enabled hunters to distance themselves from prey. By this time, the giant Ice Age mammals had disappeared. Instead large bison, deer, elk,

and other game became the primary prey for prehistoric hunters. These hunters used sophisticated hunting techniques to stampede and corral bison into natural traps and gullies.

Prehistoric groups began to use the **bow and arrow** about two thousand years ago. This new weapon increased the distance a hunter could shoot accurately. The stone projectile points on arrows were much smaller than those used with the atlatl or the hand-held spear. Bow-and-arrow hunters were the avid and sophisticated bison hunters that people imagine roaming the plains of Montana. There were few or no bison west of the **Continental Divide**, but the prehistoric people who lived there made annual trips eastward to hunt bison. These trips became especially popular when the use of the horse became widespread about 250 years ago.

In western Montana, ancient people hunted elk, deer, moose, and sheep, and they fished the many streams. On the east side of the Continental Divide, ancient people primarily hunted bison. They also hunted pronghorn antelope, elk, deer, sheep, rabbits, porcupine, beaver, marmots, and birds. Remains of these animals are found in many prehistoric archaeological sites like Pictograph Cave near Billings.

Today the **short grass plains** of eastern Montana may look devoid of natural plant and animal life. That is

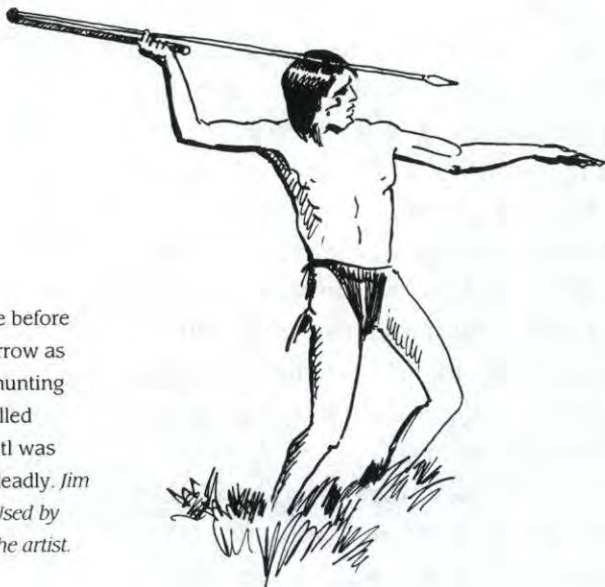
not true, but it was even less the case in prehistoric times. The grasses and other **forbs** (herb-like plants) that grew on these plains contained protein that enabled animals like bison to build up mass. This extra weight then helped them survive the cold winter months. As a result, during ancient times, immense herds of bison and other large game made their homes on the plains. This gave Montana's prehistoric people a tremendous supply of meat on the hoof!

For over eleven thousand years, large game, especially bison, was the main source of subsistence for many prehistoric people of Montana. These hunters had to be clever and successful in their endeavors to hunt these large animals. Young hunters served long apprenticeships with their elders, absorbing knowledge and experience. This enabled them to almost instinctively know what hunting strategy to use in any given situation. Before 1700, they did not have horses, and so they had to devise ingenious methods to hunt these large

game. They used **drive lines**, or lines of rock piles, to funnel animals into areas where other hunters waited to ambush and kill them. They also used drive lanes—defined by two converging lines—to lead bison to **buffalo jumps**. A **pishkin**—the name the Blackfeet used for a buffalo jump—was a steep cliff over which hunters drove bison to their deaths. If an animal did not die, hunters waiting at the foot of the cliff killed it. Native Americans used buffalo jumps heavily as a hunting method between 2,500 and 1,200 years ago.

Ancient hunters also built sophisticated **wooden corrals** to capture bison, deer, mountain sheep, and antelope. These ancient corrals were sturdily built and could hold as many as ten to twenty bison. Some ancient corrals had bison skulls around them; prehistoric hunters believed that these skulls invoked magical spirits that helped lure the animals inside. A shaman, or spiritual leader, would sing and perform rituals near the corrals to aid the hunters. Hunters also used **natural traps**, formed by ravines or draws or even sand dunes, to capture their prey. They herded animals into these natural traps where they could surround and kill them.

Once they had killed the animals, prehistoric groups immediately butchered them. Otherwise, the meat would spoil in the hot sun, and the smell would attract wolves, grizzly bears, and other predators. These people had no concept of refrigeration. They used sharp stone flakes, stone knives, and bone tools to do the butchering. The butchering process was grueling work. The average

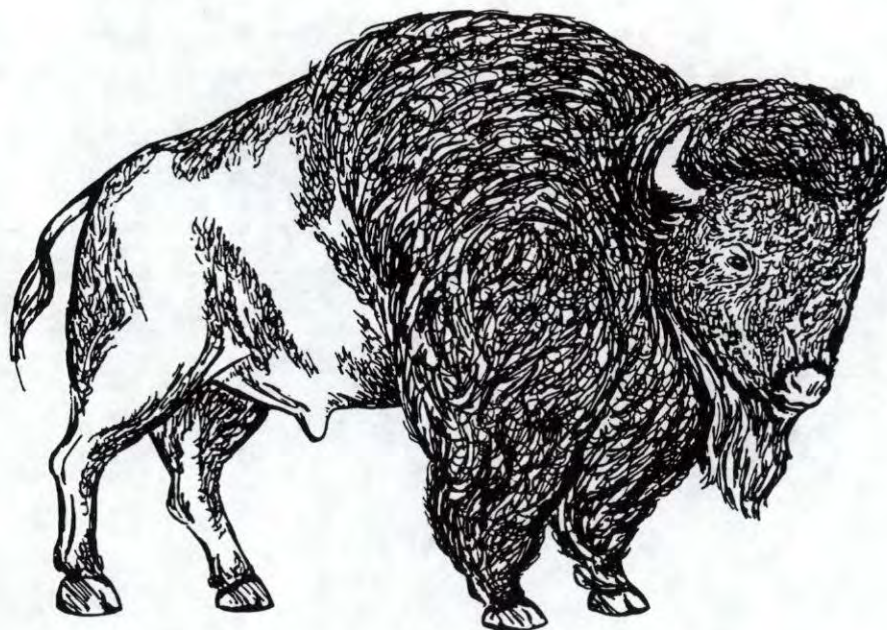


The atlatl came before the bow and arrow as the dominant hunting weapon. In skilled hands, the atlatl was accurate and deadly. *Jim Knight, artist. Used by permission of the artist.*

carcass of a female bison provided 180 kilograms of meat. After field butchering, the people hauled pieces of the carcass back to camp. Sometimes, they left excess meat at the kill site. Back at camp, they cut the meat in strips and hung it on willow frames to dry. The women dressed the hides, which were then cleaned and tanned and used for tipi covers, carrying bags, clothing, and moccasins.

Animals provided a main source of food for the subsistence of ancient people. Large animals like bison provided quantities of meat for the long Montana winter. Hunting could be dangerous, and often hunters were wounded, or even killed, in the process.

The public can visit some buffalo jump sites in Montana. These include the Bootlegger Site near Chester, the Madison Buffalo Jump near Three Forks, Ulm Pishkin near Great Falls, and the Wahkpa Chu'gn Site near Havre.



For thousands of years, the buffalo provided food, shelter, and spiritual guidance to Montana's ancient people. The buffalo remains a sacred animal to many Indian people today. *Courtesy Montana Historical Society.*

LESSON 4B—VOCABULARY: WHAT ANIMALS DID ANCIENT PEOPLE EAT, AND HOW DID THEY HUNT THEIR PREY?

atlatl _____

bison _____

bow and arrow _____

buffalo jumps _____

Continental Divide _____

drive line _____

forbs _____

mastodon _____

natural traps _____

pishkin _____

short grass plains _____

spears _____

wooden corrals _____

woolly mammoth _____

LESSON 4B—ARCH ACTIVITY: STONE TOOL MEASURING

Grades: 3–8

Time: 45 minutes

Content Area: math, science, and writing

Who: small groups and individuals

Materials:

paper and pencils

rulers (centimeters)

projectile points from Technology

Tool Kit (or pictures of points if kit is unavailable)

Artifact Data Sheet (attached)

OBJECTIVE AND OUTCOME

- Students will learn how archaeologists use measurement and math skills to study stone tool hunting technology.
- Students will use metric system to measure and record data to describe artifacts.
- Students will identify point groups for spear, atlatl, or bow and arrow.

ACTIVITY

1. Tell students they will record measurements for three different projectile point groups (A, B, and C). They will write down the number of each artifact in the group and then write its length and width on an Artifact Data Sheet. Students will be asked to identify from the measurements which points they think were used as spear, atlatl, or arrow points.

2. Divide the class into three groups. Give each group one projectile point group; each point group should include 5–10 artifacts.

3. Have each student measure—using a ruler—the maximum length and width of each artifact to the nearest millimeter. Have each student record the information for each artifact in the group on the attached Artifact Data Sheet. (They will each need three Data Sheets, one for each artifact group.) Give each group about 10 minutes to measure their artifacts, and then ask the groups to trade artifacts.

4. Once students are finished, ask Grades 3–5 to figure out the size range for each group of artifacts. What was the longest/shortest point in each group, etc.? Ask Grades 6–8 to calculate averages using the mean length and width of each projectile point group.

5. Ask students to identify which point groups were probably used for spears (largest), with atlatls (medium-sized points) and with bow and arrow (smallest points). Are there any points that might be used in two ways (overlapping range)?

6. Have students use their measurements to create a key identifying the different kinds of points.

7. Have students discuss other characteristics that distinguish the different groups (e.g. notches vs. no notches).

EXTENSIONS

3–5:

- Research vocabulary.

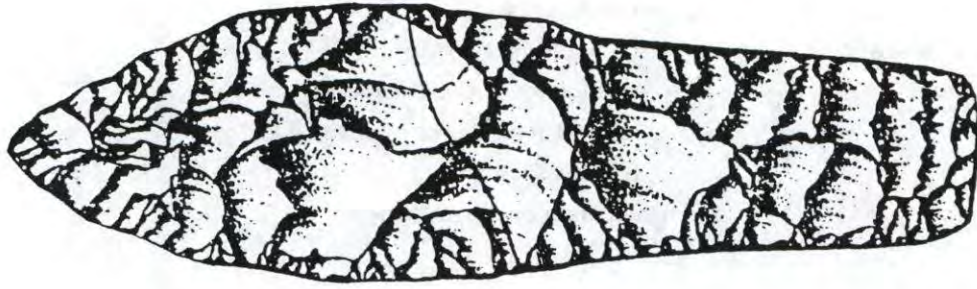
See: Lesson 4B—Vocabulary.

- Have each group measure the height of each person in their group and calculate the range of heights for the group.

6–8:

- Have each group measure the height and head size (diameter) of each person in the group. Have the group calculate the average group height and head size, using the mean and the median. Does the mean or median give the best average in this case?

LESSON 4B—ARCH ACTIVITY: STONE TOOL MEASURING
GROUP A



LESSON 4B—ARCH ACTIVITY: STONE TOOL MEASURING
GROUP B



LESSON 4B—ARCH ACTIVITY: STONE TOOL MEASURING
GROUP C



**LESSON 4B—ARCH ACTIVITY: STONE TOOL MEASURING
ARTIFACT DATA SHEET**

Name: _____

Artifact Group = _____

Artifact Number

Length (mm/cm)

Width (mm/cm)

Stone Tool Mean

Length

Width

Stone Tool Range

Length

Width

to

to

LESSON 4C—NARRATIVE: WHAT COOKING METHODS DID ANCIENT PEOPLE USE?

Prehistoric people cooked some foods in order to make them edible and tasty. The ancient people who migrated to North America brought the ability to make fire with them. They had **fire drills**. The user of a fire drill rapidly spins one piece of wood atop another piece. This friction creates enough heat to eventually start a fire. Old World archaeological evidence of fire-blackened hearths in caves indicates that humans began to consistently build and use fires about three hundred thousand years ago.

Ancient people cooked plants in **excavated pits**. These excavated pits served as prehistoric ovens. Prehistoric cooks dug a hole in the ground and built a fire in the hole. They then allowed the fire to die down into coals. Once the fire died down, they placed stones on top of the coals and then green, non-food plants on the hot stones. They then placed the plants to be cooked on top of the greens and covered them with more green, non-food plants. This process allowed the slow baking of roots, such as biscuit-root, bitterroot, camas, and others. Archaeologists have found these ancient ovens in prehistoric sites throughout Montana. An early example was discovered in the Barton Gulch site in southwestern Montana.

People also cooked meat in excavated pits. They built a fire inside a pit and allowed it to die down to coals. They then placed stones in the pit and put meat inside an **animal skin pouch**.

Ancient people used excavated pits and hide containers to cook their food.

Once the stones were heated, they placed the pouch directly on the hot stones. Then they covered the pouch with earth or mulch, leaving the meat to cook for several hours, or even a day. They also cooked meat directly on large flat rocks heated in fire pits. In addition, they sometimes roasted meat on a spit directly over an open fire or **fire hearth**.

Prehistoric people created cooking containers from animal skins. They cooked roots, bulbs, plants, and meat inside these ancient pots. These hide cooking containers were never placed directly over a fire because they would burn. Instead, prehistoric cooks placed water inside the **hide container** and added hot stones, making the water boil. They then added foods to the boiling water. Archaeologists refer to this method of cooking as **stone-boiling**.

Ancient people also dried foods in the sun. Meats, plants, and berries could be cooked by solar energy. Photographs of Indian camps in the late 1800s show **drying racks** with hundreds of pieces of meat hanging over willow frames. Photographs also show women placing berries on animal hides to dry them in the sun. Sun drying preserved food for use at another time. It was an important way of storing food for the long winter months.



After butchering their meat, ancient people dried it in the sun to preserve it for future eating. They scraped animal hides for clothing and shelter, and they used hide containers as cooking pots for stone-boiling. *Courtesy Montana Historical Society.*

LESSON 4C—VOCABULARY: WHAT COOKING METHODS DID ANCIENT PEOPLE USE?

animal skin pouch _____

drying rack _____

excavated pits _____

fire drills _____

fire hearths _____

hide containers _____

stone-boiling _____

LESSON 4C—ARCH ACTIVITY: WHAT'S ON THE MENU?

Grades: 3–8

Time: 40 minutes

Content Area: science and writing

Who: small group

Materials:

pencils and paper

Arch Journal

"Foods I Eat" worksheet (attached)

OBJECTIVE AND OUTCOME

- Students will compare their modern diet with that of ancient Montanans.
- Students will record foods consumed for a day. They will devise a summer and winter menu for prehistoric Montanans and compare these menus with their own.

ACTIVITY

1. Read or summarize to the students the narratives for Lessons 4A and 4B on the kinds of plants and animals prehistoric people ate.

2. Divide students into four groups. Give each group a "Foods I Eat" Worksheet. Ask each group to select a writer and a presenter. Have each student tell the writer what they ate the previous day for breakfast, lunch, and dinner. The writer puts this information on the "Foods I Eat" Worksheet.

3. Instruct each group to next devise two daily menus (breakfast, lunch, and dinner) for prehistoric hunters and gatherers living 1,000 years ago, one for summer and one for winter. Discuss differences in available foods with the changing seasons. The writer should write down the prehistoric menus for summer and for winter that his or her group comes up with.

4. Ask each group to present to the whole class their winter and summer menus for prehistoric hunters and gatherers. They should also discuss

and compare their group's typical menu today with that of people living 1,000 years ago.

5. Ask students to think about and discuss why we have such a varied diet compared to prehistoric people? What technology do we have that allows us this luxury (i.e. grocery stores, trucks to bring food from far away, refrigeration, etc.)?

EXTENSIONS

3-5:

- Research vocabulary.

See: Lesson 4C—Vocabulary.

- Illustrate a prehistoric menu. Draw food people would have eaten 1,000 years ago.

6-8:

- Ask students to calculate the number of calories for each meal they consumed the previous day. Have them estimate how many calories there would be in the prehistoric menu they created. Are there differences? What are they?

- Have class watch and discuss cooking methods in the video: *People of the Hearth*.

LESSON 4C—ARCH ACTIVITY: WHAT'S ON THE MENU?
FOODS I EAT WORKSHEET

FOODS I EAT

NAME **BREAKFAST** **LUNCH** **DINNER**

NAME	BREAKFAST	LUNCH	DINNER

Adapted from: *Discovering Archaeology in Arizona*

LESSON 4D—NARRATIVE: HOW DO ARCHAEOLOGISTS ANALYZE ANCIENT PLANT AND ANIMAL USE?

Archaeologists study animal and plant remains at ancient sites to determine what prehistoric people ate. These remains are sometimes referred to as **ecofacts**, because they tell us about the ecology and environment of prehistoric people. Ancient hunters left animal bones at butchering sites, and both animal and plant remains can be found in or near fire hearths or excavated cooking pits. Nomadic hunters and gatherers usually did not create special trash dumps for disposing their garbage, but village people did.

Bones are a kind of ecofact that archaeologists study. The study of animal bones is called **faunal analysis**. Each animal species has a distinct bone structure. That structure identifies the type of animal a bone came from. A femur, or upper leg bone, of a deer is different in size and shape from that of a bison. **Zoologists** can identify the differences and determine which kind of animal was killed. Sometimes they can also tell the season of the year that an immature animal was killed. They do this by using **tooth eruption schedules**. Animals with “baby” teeth can be distinguished from older adults with full sets of worn teeth. By studying modern animals, zoologists can determine the age at which different baby teeth come in. They then use this information to determine not only how old a young animal was at death, but also—based on birthing in the spring—what season

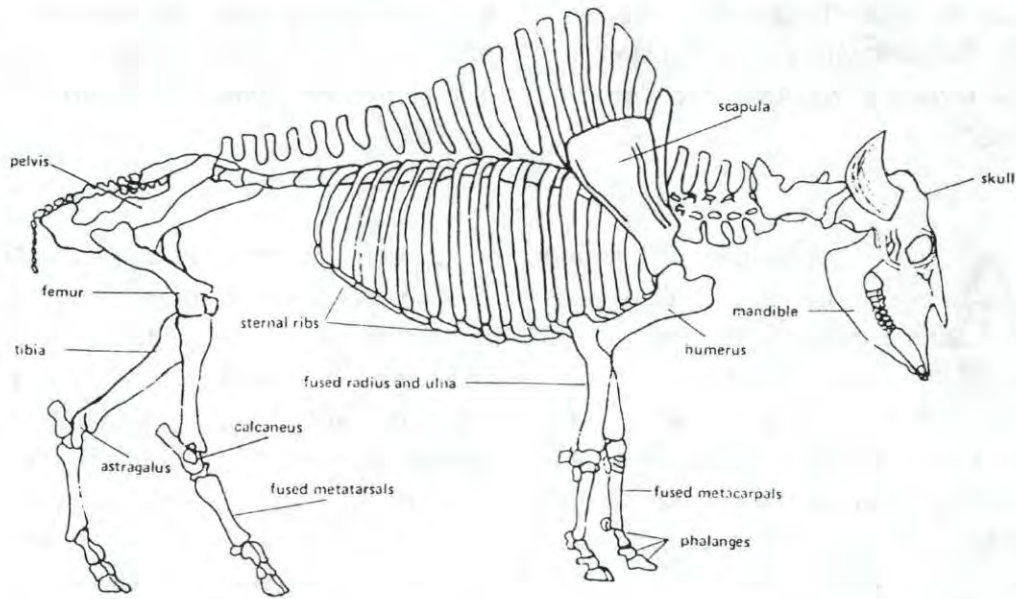
Archaeologists who specialize in plant and animal remains analyze those remains in laboratories.

of the year it was when the animal died.

Analysis of a site includes dating bones, charcoal, or any other organic material that contains carbon. An **absolute date** using **radiocarbon dating** can identify the time in prehistory, or how many years ago, a cooking pit was used by ancient people. (See **Lesson 3F—Narrative: How Do Archaeologists Analyze and Date Ancient Technology?** for an explanation of radiocarbon dating.) Archaeologists can also determine the age of bones by using **amino acid dating**. This newer and less-tested technique measures the relative amount of the decay of **protein molecules** within bone. The older the bone is, the more protein decay will have occurred. Through the use of dating and the study of bones, archaeologists can determine the type of animals killed at a site, how long ago they were killed, and sometimes what time of the year they were killed.

The study of plant remains is called **floral analysis**. Generally, the amount of plant remains preserved at archaeological sites is very small. Usually only the hardest parts of plants—like seeds—are preserved. **Carbonized** plant remains that were burned in a cooking fire are better preserved than unburnt plant materials. Also, because these remains were burnt, they are more easily identified as plants used in cooking and eating rather than as plants simply

Different animals have different skeletons. This is a typical buffalo skeleton. By studying the animal bones found at an archaeological site, faunal analysts can usually determine not only which animals were hunted, but also how old they were when they died. Taken from B. Miles Gilbert, *Mammalian Osteo-Archaeology: North America* (The Missouri Archaeological Society, Inc., 1973).



growing on the site. When archaeologists excavate a prehistoric site, they save dirt samples and take them to a laboratory. In the lab, specialists use **flotation** to search for ancient plant remains. Flotation is a method of washing the dirt with water. As water is added to the dirt, carbonized seeds and other plant fragments float to the top. Scientists then collect these fragments with a fine screen net and study them under a **microscope**. Just as the bones of each species of animal are unique, each plant species has distinctive seeds and other parts. By studying the plant fragments collected through flotation, archaeologists can determine the plant types eaten and cooked at prehistoric sites.

In search of remains of plants and animals, archaeologists also study the **stratification**, or layering of materials, at sites. The most recent layer of soil is that located at or near the ground surface. Older layers of soil are buried beneath. Determining the age of artifacts and ecofacts through stratifica-

tion is called **relative dating**; this means that a layer of artifacts is determined to be older or younger relative to the layers above and below it. By studying the contents of different layers, or **strata**, for clues, archaeologists can determine changes in the types of foods eaten by prehistoric people through time.

Archaeologists often call in scientists from other realms of science to help answer questions about plants and animals at prehistoric sites. **Geologists, zoologists, botanists, and palynologists** (scientists who study plant pollen) often help archaeologists to solve the mysteries of the past. Teamwork is critical to interpreting the past. You can assist in the preserving the past by leaving archaeological sites undisturbed. If you come across an important site or artifact, call your local Forest Service or Bureau of Land Management office or the State Historic Preservation Office (SHPO) in Helena. Preserving the past for future generations is vitally important.

LESSON 4D—VOCABULARY: HOW DO ARCHAEOLOGISTS ANALYZE ANCIENT PLANT AND ANIMAL USE?

absolute dating _____

amino acid dating _____

botanists _____

carbonized _____

ecofacts _____

faunal analysis _____

floral analysis _____

flotation _____

geologists _____

microscope _____

palynologists _____

protein molecules _____

relative dating _____

radiocarbon dating _____

strata _____

stratification _____

tooth eruption schedules _____

zoologists _____

LESSON 4E—NARRATIVE: WHO IS AN ARCHAEOLOGIST WHO STUDIES ANCIENT SUBSISTENCE?

Steve Aaberg is an archaeologist who studies ancient subsistence.

Steve Aaberg is an archaeologist who specializes in the study of ancient subsistence. Steve studies plants, animals, and cooking methods used by ancient people. He grew up in Chester, Montana, and was interested in archaeology when he started college. During his studies and fieldwork, he noticed a lack of research on how Montana's prehistoric people used native plants. Since native plants held an interest for him, Steve decided to specialize in paleoethnobotany, the study of native plants used by ancient people.

Archaeologists know that plants were extremely important to the health and well-being of early people. Paleoethnobotany is a valuable tool in the interpretation of prehistoric subsistence. Steve's work as a paleoethnobotanist is to unearth and study plant remains found at archaeological sites. He determines which plants were used by ancient people and how they were prepared. Ancient people used native plants as food, as medicine, in ceremonies, and in industry for tools and weapons. Plant resources varied throughout the year; where prehistoric people settled and moved depended upon whether plants were available. Paleoethnobotany also provides information about specific activities at sites, as well as how sites were formed.

Steve's work focuses on prehistoric archaeology. He is most intrigued by the success of ancient hunter-gatherers in their interaction with the environment.

Their stability and strength allowed the same basic lifestyle to survive for over eleven thousand years! Steve also uses ethnoarchaeology in his investigations. Ethnoarchaeology is the study of existing native cultures to apply their current knowledge to the study of the past. Steve works with modern-day Native Americans to learn more about ancient people.

Steve conducts his archaeological work through his business, Aaberg Cultural Resource Consulting Service, Billings, Montana. Most of his work is compliance archaeology, making sure that preservation laws are followed during land developments. He attended college at Montana State University, Bozeman, and at the University of California, Berkeley. Steve credits his professors, Dr. Les Davis and Dr. Tom Roll, of MSU, in teaching him the excitement and joy of archaeological fieldwork.

Steve has worked at hundreds of sites in Montana, Wyoming, North Dakota, and South Dakota. Each discovery he has made represents a piece in the puzzle of prehistoric lifeways in the Plains region. Steve has researched and published results on the Poverty Point Site in northern Louisiana. Poverty Point is one of the oldest and largest mound complexes in North America. Steve has also researched and published results on Teotihuacan, in central Mexico. Teotihuacan is one of the largest and oldest urban/city sites in the New World.

Steve's favorite Montana site is Barton Gulch, located in southwestern Montana near Dillon. Barton Gulch is one of the oldest sites in Montana, dated at 9,400 years old. Cooking features at the site demonstrate that prehistoric people had well-thought-out plans for preparing plant and animal remains. The patterned cooking hearths there represent one of the earliest examples of systematic plant use and preparation in the Northern Plains region.

The most exciting discoveries Steve has unearthed were at Barton Gulch. At that site, ecofacts of charred seeds, stems, spines, and other parts from thirty different plant species have been identified! They were recovered from a series of over one hundred cooking features. The ecofacts and features indicate that, at a very early time, prehistoric Montanans were using a variety of plants for various purposes. Steve hopes in the future to find a Montana site revealing evidence of plant use pre-dating ten thousand years ago!

Steve's favorite methods of analysis are plant macrofossil and microfossil studies. Plant macrofossils are carbonized, or burned, plant remains such as seeds, stems, leaves, and roots. The best-preserved plant remains are those charred in cooking hearths. Plant microfossils are pollen, opalphytoliths, and starch grains that can only be seen with a microscope. Plants produce durable macrofossil and microfossil remains that are unchanged through time. By studying those remains, Steve and other paleoethnobotanists can identify the plants past people used and reconstruct the environments in which those people lived.

Steve says that the easiest part of his job is the fieldwork. It takes him to some remote and beautiful areas of Montana that he otherwise might not see. He also meets some very interesting Native Americans who are knowledgeable about historic and current plant use.

The most difficult part of his job is accepting the fact that some sites and areas will be disturbed or destroyed as Montana grows and develops. Although laws require study of historic and prehistoric sites before they are destroyed, it is still difficult to see those resources disappear.

When asked what he believes the future holds for archaeology, Steve responds: "I believe there will be an increase in our efforts to protect and preserve archaeological sites for future generations. Technical innovations to interpret the archaeological record will develop. Reconstructing past environments will be more important. Interpreting the way people interacted with their environment and one another will expand. For example, current research is presenting more evidence that prehistoric people entered the New World from various parts of the earth. This suggests North America may have been a 'melting pot' of cultures long, long ago. I believe archaeology will be a people's science. Knowledge about the past will be more accessible."

Steve suggests that, if you are interested in archaeology, you should study the natural sciences, such as biology, botany, geology, and soil science. In addition, he sends this message: "Young people informed about Montana's prehistory can do their part to discourage vandalism and looting of archaeological sites. You can encourage



your communities to protect archaeological sites when these nonrenewable resources are threatened by development.”

In addition to his archaeological work, Steve enjoys playing the guitar, listening to blues and jazz music, and fly fishing. His family includes his mother Helen and his brother Philip. Students interested in archaeology can contact Steve at:

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Steve Aaberg (right) relies on the knowledge of Indian people to help him understand how plants might have been used in the prehistoric past. Steve worked with Salish elders Harriet Whitworth (left) and Felicity McDonald (middle background) during an ethnobotanical study on the Flying D Ranch near Bozeman, Montana. *Tom Cook, photographer, Montana Historical Society.*