

# Science Unit 3: Bison and Archaeology



Photo Credit: [http://commons.wikimedia.org/wiki/File:Hudson-Meng\\_Bison\\_Bonebed\\_-\\_Part\\_of\\_Excavated\\_Bonebed.JPG](http://commons.wikimedia.org/wiki/File:Hudson-Meng_Bison_Bonebed_-_Part_of_Excavated_Bonebed.JPG)

# The American Bison

Bison were once numerous across North America ranging from Mexico to Canada (the brown sections on the map). There use to be **MILLIONS** of bison roaming the Great Plains.

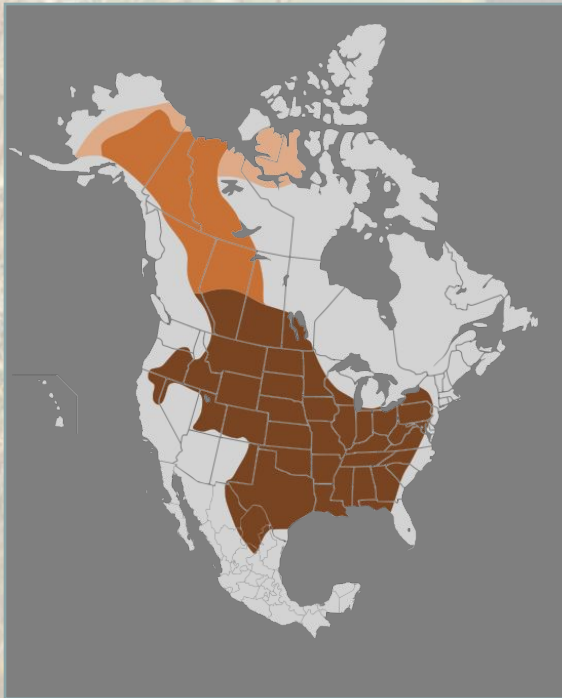


Photo Credit: Left: [http://commons.wikimedia.org/wiki/File:Bison\\_original\\_range\\_map.svg](http://commons.wikimedia.org/wiki/File:Bison_original_range_map.svg) Photo Credit: Left: [http://commons.wikimedia.org/wiki/File:Bison\\_original\\_range\\_map.svg](http://commons.wikimedia.org/wiki/File:Bison_original_range_map.svg) Right: [http://shelledy.mesa.k12.co.us/staff/computerlab/ColoradoLifeZones\\_Plains\\_Adaptations.html](http://shelledy.mesa.k12.co.us/staff/computerlab/ColoradoLifeZones_Plains_Adaptations.html)

A photograph of a bison in a field of tall grass and wildflowers. The bison is the central focus, looking towards the camera. The text is overlaid on the bison's body.

**HOW WOULD  
YOU HUNT  
BISON?**



Native Americans would wear wolf skins to get close to the herd and mask their human smell. Bison have a great sense of smell, but very poor eyesight.

Photo Credit: Top: <http://1onewolf.com/lakota/Wolf/index.htm> Photo Credit: Top: <http://1onewolf.com/lakota/Wolf/index.htm> Bottom: <http://lastbestnews.com/site/2014/09/prairie-lights-prey-animals-know-which-species-most-to-fear/>

# Hunting Bison



Photo Credit: Top:

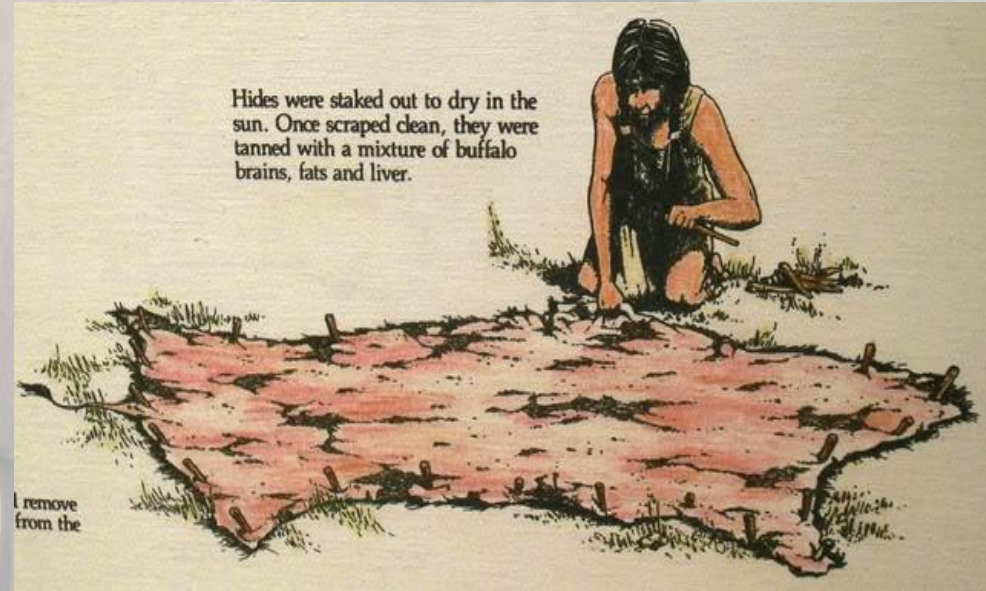
<http://nativeamericannetroots.net/diary/tag/Buffalo> Photo Credit: Top:

<http://nativeamericannetroots.net/diary/tag/Buffalo> Bottom:

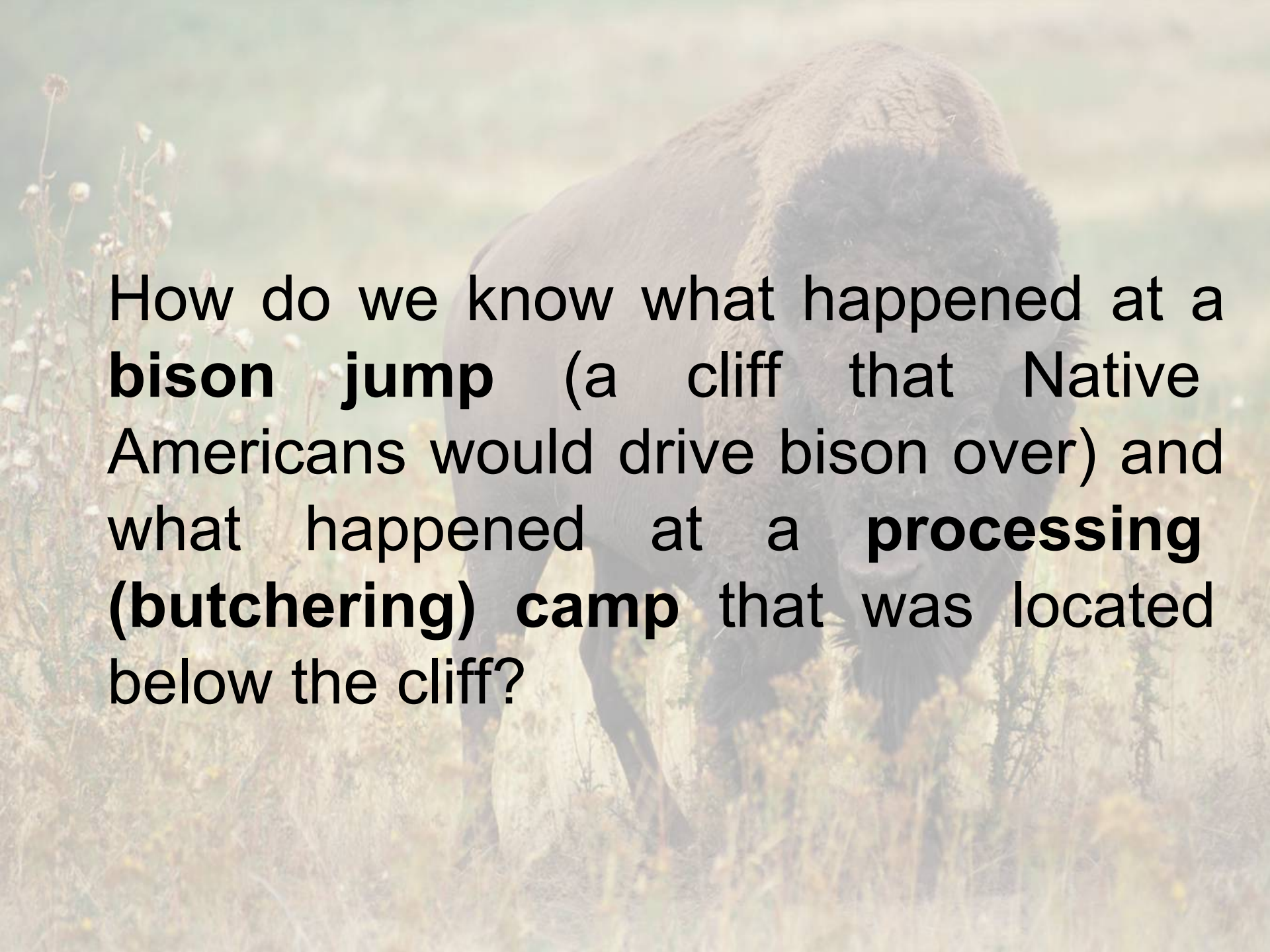
<http://www.texasbeyondhistory.net/plateaus/prehistory/images/earliest.html>

Long ago, instead of hunting each bison individually which was tough and sometimes very, very dangerous, Native American Tribes would drive bison over a cliff. These cliffs are called **Bison Jumps**. Sometimes their fall was over 40 feet!

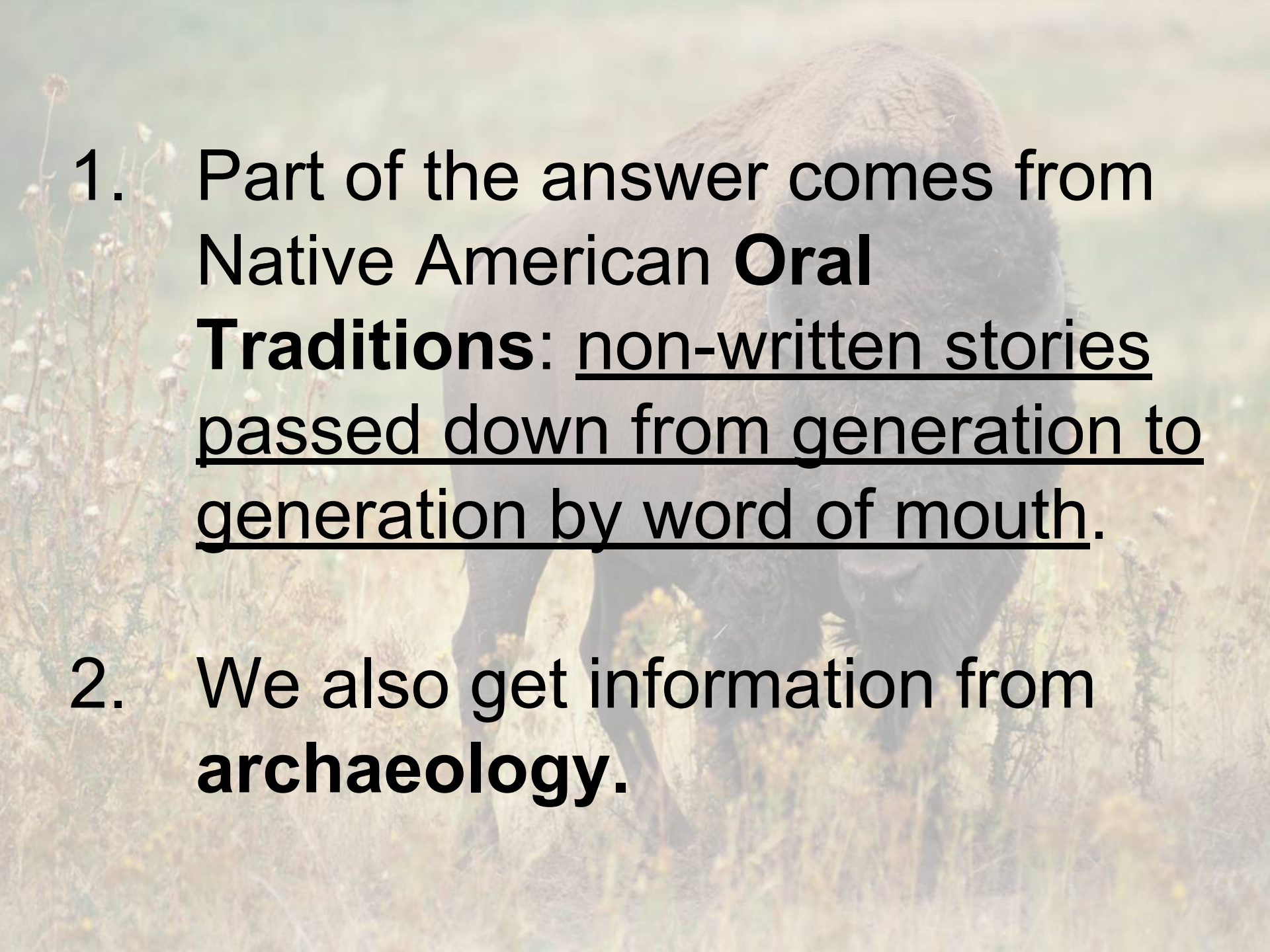
# Processing Camp: Butchering the Meat



Bison were butchered for **food, tools, clothing, and ceremonial objects**. The picture on the left shows Native Americans boiling bison bone for nutrient-rich fat. The picture on the right shows a drying bison hide to make a tipi or robe.

A bison is shown in a field of tall grass and wildflowers. The bison is dark brown with a thick, shaggy mane around its head and neck. It is looking down and slightly to the right. The background is a soft-focus landscape of green and yellow vegetation under a bright sky.

How do we know what happened at a **bison jump** (a cliff that Native Americans would drive bison over) and what happened at a **processing (butchering) camp** that was located below the cliff?

- 
- A bison is visible in the background, standing in a field of tall grass and wildflowers. The image is slightly faded to allow the text to be the primary focus.
1. Part of the answer comes from Native American **Oral Traditions**: non-written stories passed down from generation to generation by word of mouth.
  2. We also get information from **archaeology.**



A photograph of a bison standing in a field of tall, dry grass and small flowers. The bison is the central focus, looking slightly to the right. The background is a soft-focus landscape of green and yellow. Overlaid on the image is the text "WHAT IS ARCHAEOLOGY?" in a large, bold, black, sans-serif font.

# WHAT IS ARCHAEOLOGY?

**Archaeology is the study of past human behavior and activity.**



Photo Credit: <http://en.wikipedia.org/wiki/Archaeology>

- Archaeologists study past human behavior through **material remains**.
- Material remains can include **artifacts** like arrowheads and pottery, as well as skeletal remains like bison bones.



Photo Credit: Left:

[http://he.wikipedia.org/wiki/%D7%99%D7%A4%D7%AA%D7%97%D7%90%D7%9C\\_%28%D7%90%D7%AA%D7%A8\\_%D7%90%D7%A8%D7%9B%D7%90%D7%95%D7%9C%D7%95%D7%92%D7%99%29#/media/File:Yiftahel\\_Pre-Pottery\\_Neolithic\\_B\\_flint\\_arrowheads.jpg](http://he.wikipedia.org/wiki/%D7%99%D7%A4%D7%AA%D7%97%D7%90%D7%9C_%28%D7%90%D7%AA%D7%A8_%D7%90%D7%A8%D7%9B%D7%90%D7%95%D7%9C%D7%95%D7%92%D7%99%29#/media/File:Yiftahel_Pre-Pottery_Neolithic_B_flint_arrowheads.jpg) Photo Credit: Left:

[http://he.wikipedia.org/wiki/%D7%99%D7%A4%D7%AA%D7%97%D7%90%D7%9C\\_%28%D7%90%D7%AA%D7%A8\\_%D7%90%D7%A8%D7%9B%D7%90%D7%95%D7%9C%D7%95%D7%92%D7%99%29#/media/File:Yiftahel\\_Pre-Pottery\\_Neolithic\\_B\\_flint\\_arrowheads.jpg](http://he.wikipedia.org/wiki/%D7%99%D7%A4%D7%AA%D7%97%D7%90%D7%9C_%28%D7%90%D7%AA%D7%A8_%D7%90%D7%A8%D7%9B%D7%90%D7%95%D7%9C%D7%95%D7%92%D7%99%29#/media/File:Yiftahel_Pre-Pottery_Neolithic_B_flint_arrowheads.jpg) Right:

# Artifacts Act as a Puzzle Piece

Think of an artifact as a puzzle piece:

Each puzzle piece (artifact) is very important! As you find puzzle pieces, the picture of the past becomes clearer. But usually, you never get the full puzzle. So archaeologists try to figure out the past with the few puzzle pieces they have.



# Study of the Bison Skeleton

The study of the bison bones that are left behind can tell you a lot about what people were eating and not eating, what people were using for tools, and the ways in which people prepared the food and manufactured those tools.

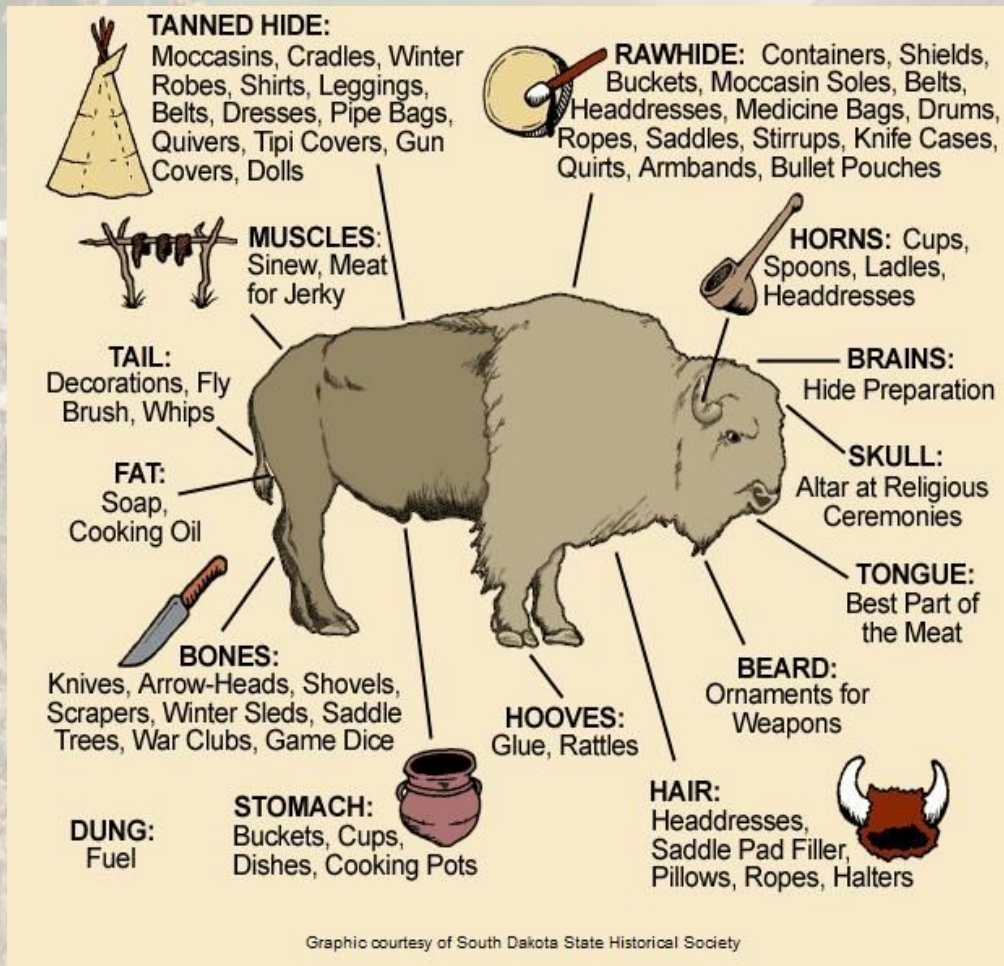


DO YOU SEE THE **CUTMARKS**  
ON THE BISON BONE?



What might people have been doing  
to these bison bones to make them  
dark black?

# Many Parts of the Bison Were Used



- For many thousands of years before European contact, bison were hunted by many Native Americans for food and tools.
- Many parts of the bison were used for food, tools, clothing, weapons, fuel, and a variety of cultural and ceremonial items.

# Many More Uses of Bison

## A “Walking Department Store”

### Pelt

warm winter clothing  
floor covering  
moccasins  
blankets  
drums  
saddles  
bullboats  
masks

### Hide (without hair)

tipi covers  
clothing  
parfleches  
shields  
containers  
rattles  
bedding  
mittens  
dolls  
trade items

### Hoofs, Feet

glue  
rattles

### Sinew (muscles)

laces  
thread  
bowstrings  
bow backings  
bindings

### Chips

fuel  
ceremonial smoking  
smoke signals

### Tail

whips  
ornaments  
fly swatters

### Bladder, Stomach

waterproof bag  
pouches  
cooking vessels  
water vessels  
buckets

### Brains

hide tanning

### Teeth

necklaces

### Fat

mixed with  
powdered meat to  
make pemmican

### Skull

religious  
ceremonies

### Horns

headdresses  
containers  
clubs  
cups  
spoons  
ladles  
fire carriers  
toys

### Edible Parts

meat  
marrow  
tongue  
intestines  
liver  
blood  
other innards

### Hair

headdresses  
padding  
stuffing  
ropes  
halters  
ornaments  
paintbrushes  
shields  
saddles

### Bones

arrow shafts  
sled runners  
knives  
shovels  
hoes  
saddle trees  
war clubs  
scrapers  
awls for sewing  
paintbrushes  
game counters  
tool handles  
ceremonial objects



# And then...



A pile of bison skulls from animals hunted by early settlers and fur traders. This is one, OF MANY, piles.

Bison were hunted until they were close to **extinction**: no living members of that animal left on earth.

Bison were hunted for their meat, but mostly for their hide that could be used for belts in industrial factories.



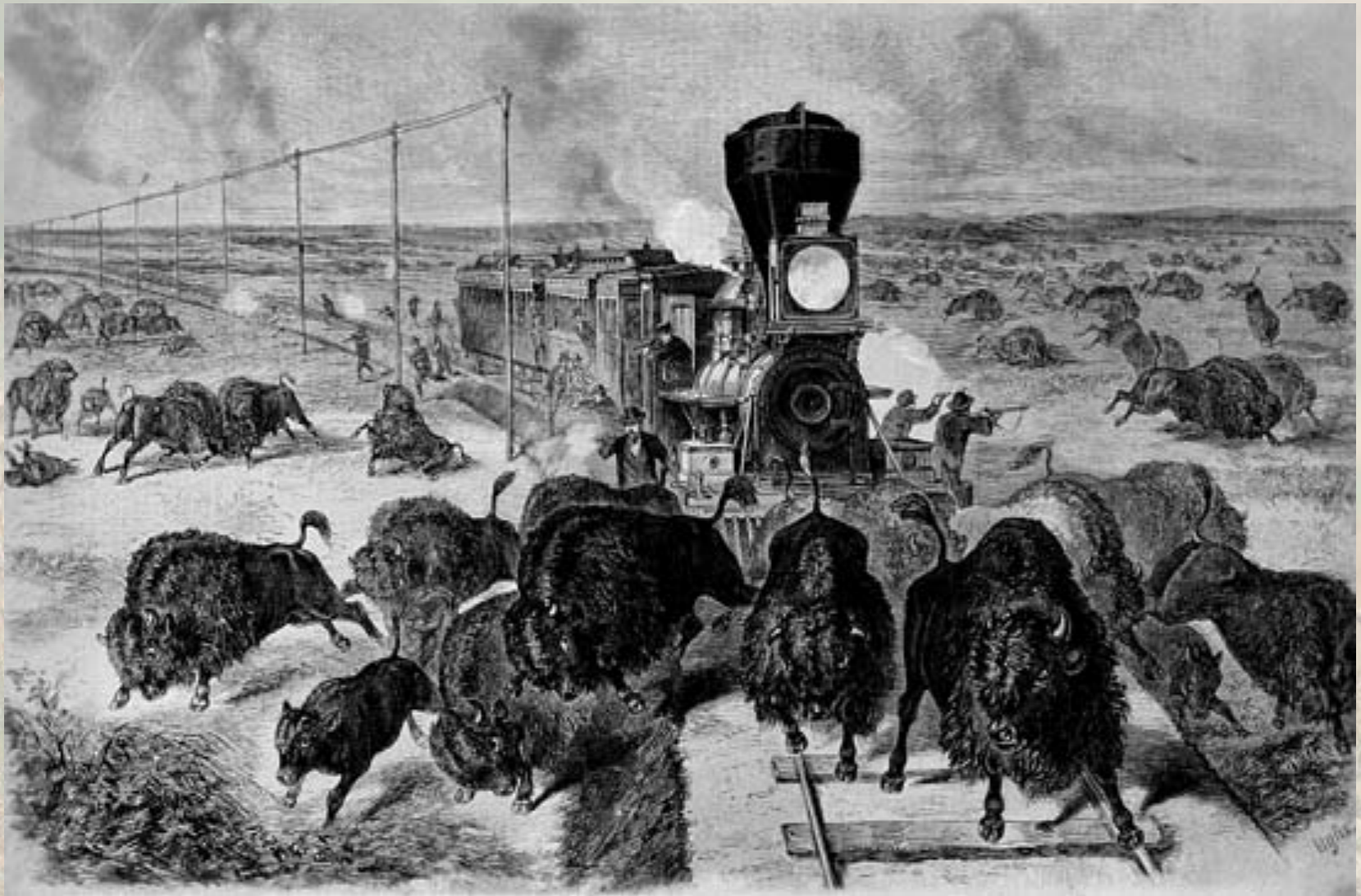


Photo Credit: <http://rewilding.org/rewildit/around-the-campfire-with-uncle-dave-the-buffalo-are-gone/>

Bison were also hunted for sport and entertainment during long train rides heading west. Sometimes, the meat wasn't even collected, just left to sit by the side of the tracks.

# Bison Restoration

Luckily, before bison were **exterminated** (hunted to extinction), people began opening vast tracts of land for bison conservation.



One place is Yellowstone National Park. **Do you know where Yellowstone National Park is?**



A bison is the central focus of the image, standing in a field of tall, dry grasses. The bison is dark brown with a thick, shaggy coat. Its head is turned slightly to the right, and its horns are visible. The background is a soft, out-of-focus landscape of green and yellow grasses. The text 'STATION ACTIVITY' is overlaid in the center of the image in a large, bold, black font.

# STATION ACTIVITY

Put on the hat and shoes of an archaeologist and try to solve some of the mysteries of the past!

# STATION 1: (AS A WHOLE CLASS)

## Bison Skeleton Labeling

Cranium

Mandibles

Cervical Vertebrae

Scapula

Humerus

Radius

Metacarpal

Carpals

Ulna

Ribs

Os Coxae

Sacrum

Femur

Patella

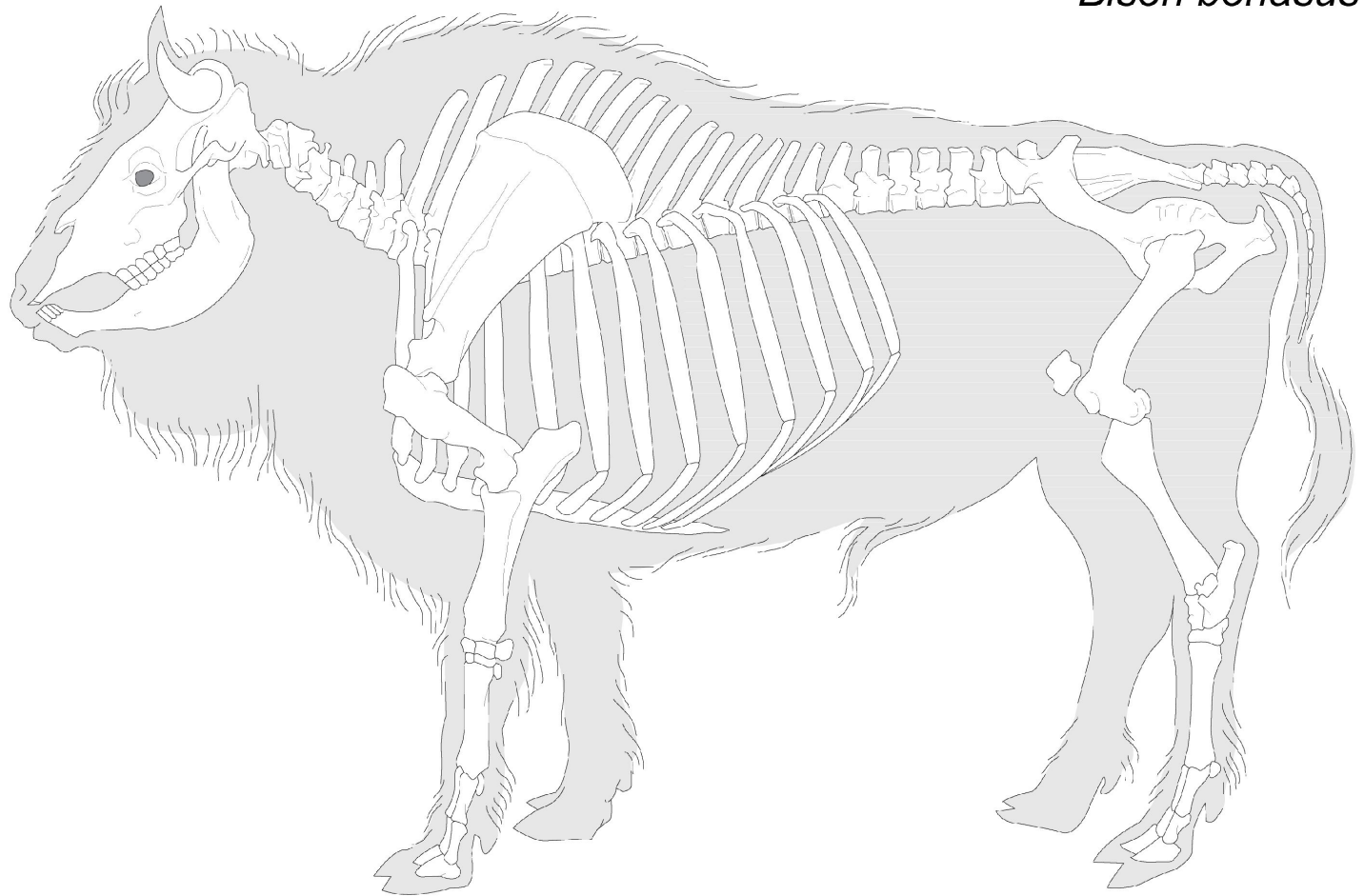
Tibia

Tarsals

Metatarsals

Phalanges

*Bison bonasus*

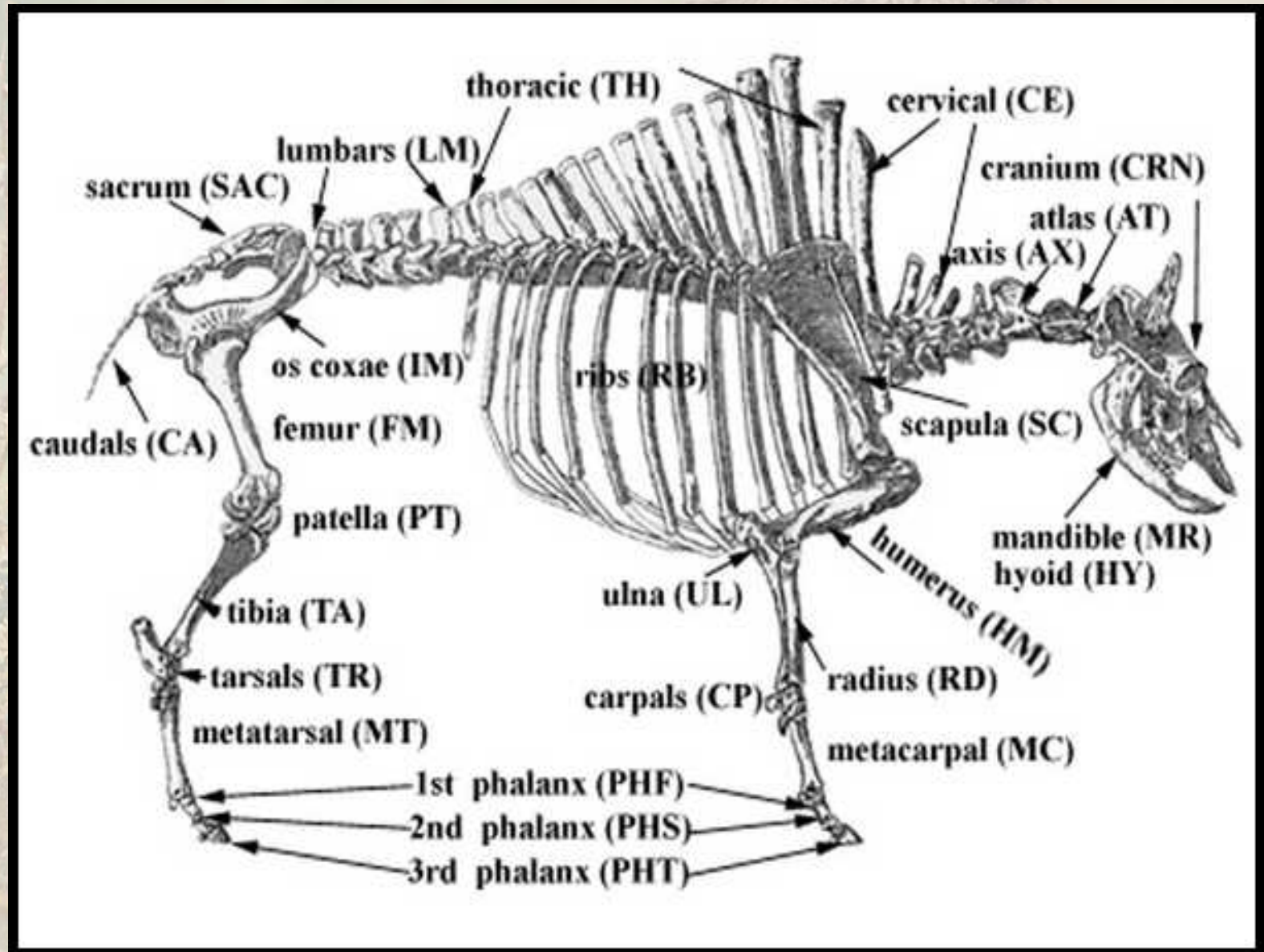



Référence : Dessin Michel Coutureau (Inrap) - © 2003 ArcheoZoo.org  
D'après : Rouzaud Anne, Le bison et l'aurochs. In : *Préhistoire et archéologie*, n° 24, novembre 1980, p. 9. (illustration notée "M. Garcia d'après Ducroloy de Blainville").

Can you match any of the bison bones on the left with the skeleton on the right?

# Bison Skeletal Anatomy

Go ahead and label your individual sheets with any bones you missed!



A bison is the central focus of the image, standing in a field of tall, dry grass and wildflowers. The bison is facing forward, slightly to the right. The background is a soft-focus landscape of rolling hills under a hazy sky. The overall tone is natural and somewhat muted.

# **Break up into groups, one group per station to begin the Bison Bone Lab Challenge!**

*(PowerPoint will proceed after the students have completed the Bison Bone Lab Challenge)*

# Station 2: Bison skeleton reassembling

A bison is the central focus of the image, standing in a field of tall, dry grass and wildflowers. The bison is facing forward, slightly to the right. The background is a soft-focus landscape of more grass and flowers under a bright sky. The text is overlaid on the left side of the image.

**How did you all do?**

**Were you able to assemble the whole skeleton?**

**Was it tough?**

**Do you think you could reassemble the skeleton if half the bones were missing?**

# Station 3



Photo Credit: <http://www.thefossilforum.com/index.php?gallery/image/27143-bison-phalanges/>

**The phalanges are the toe bones.**

The darker black stain is likely from the soil, darker soils usually suggesting a high level of organic material (vegetation).



# Station 3 (Continued)



Photo Credit: <http://www.thefossilforum.com/index.php?/gallery/image/5-bison-astragalus-a/>

## Tarsal: ASTRAGULUS

The astragalus bone, or ankle bone, is in the collection of bones in the foot, otherwise known as the tarsus. The grey clay color suggests a wetland environment. A reddish discoloration on the bone is from the natural of oxidation. **What is oxidation?**

# Oxidation

**Oxidation** is a process by which a material becomes exposed to oxygen and begins to change chemically. For example, iron that has been exposed to air and moisture for too long begins to turn orange and red. We call this **rust**. When iron is rusting, it is undergoing a process of oxidation.

# Station 4

UNIDENTIFIABLE BURNT BONE

**What could burned or charred bone mean?**

**What types of activities might cause burned or charred bone?**

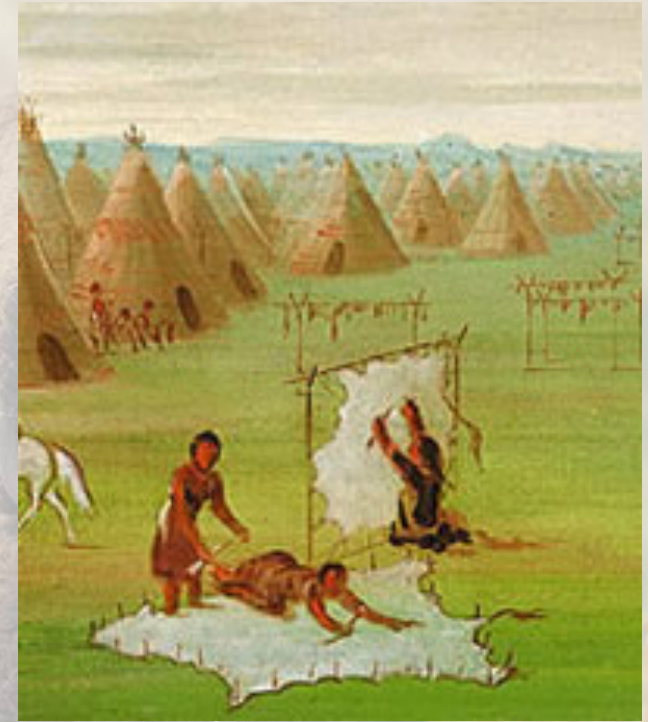


Photo Credit: Left: Imagining Head-Smashed-In by Jack Brink, <http://formontana.net/boiling.html> Photo Credit: Left: Imagining Head-Smashed-In by Jack Brink, <http://formontana.net/boiling.html> Right: <http://www.texasbeyonhistory.net/kids/newwords.html>

The bones show clear signs of **breakage and burning** which give it that **blackened, ashy color**. This is caused by heating and cooking the bones over a fire. Although, this charred bone could also be caused by prairie fires. Archaeologists study the bones to determine what happened.

Breaking, burning, or boiling the bones allow the fat to be extracted (taken out). Fat is often extracted by boiling the bones and letting the fat rise to the surface of the water. Then you can easily scoop the fat out.

# Station 5

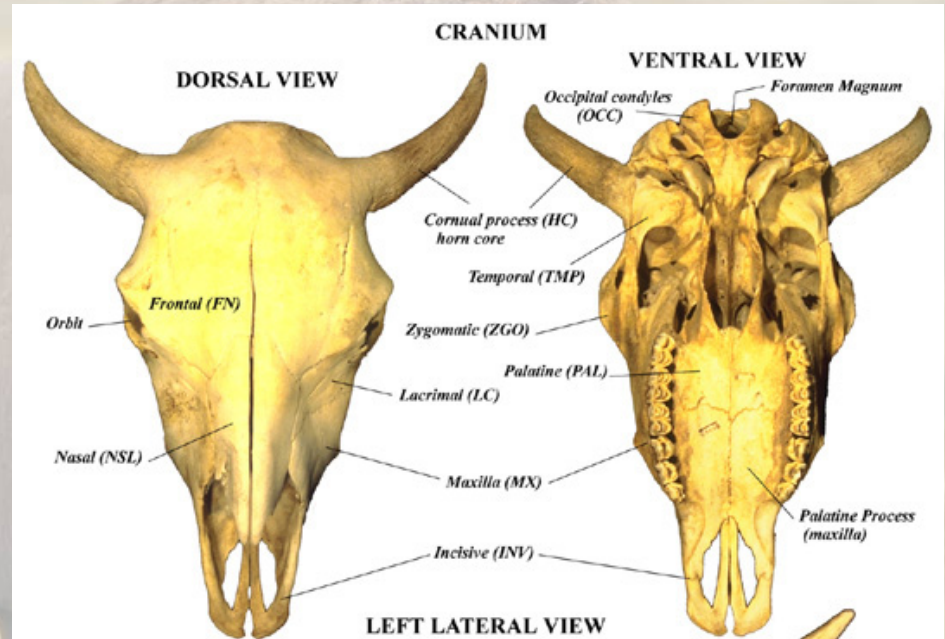


Photo Credit: Left: [http://www.skullsunlimited.com/record\\_variant.php?id=3117](http://www.skullsunlimited.com/record_variant.php?id=3117) Photo Credit: Left: [http://www.skullsunlimited.com/record\\_variant.php?id=3117](http://www.skullsunlimited.com/record_variant.php?id=3117) Right: <http://lamar.colostate.edu/~lctodd/cranial.htm>

**Part of a bison cranium:** it has clearly been broken. Bison skulls are sometimes smashed, and the jaws broken apart. People would do this to get the brains and tongue inside. The fluid in the brain was used to tan the hide of the animal. Skulls were also broken apart to remove the horns and horn cores.

# Station 5 (continued)



Photo Credit: <http://www.nps.gov/features/yell/slidefile/mammals/bison/Page-3.htm>

## **A broken PELVIS bone**

This bone is much lighter and more porous than the bison rib (found in Station 6). Breakage of this bone could be related to humans activity when they processed (butchered) the bone, or it could have been broken by cattle trampling it.

# Station 6

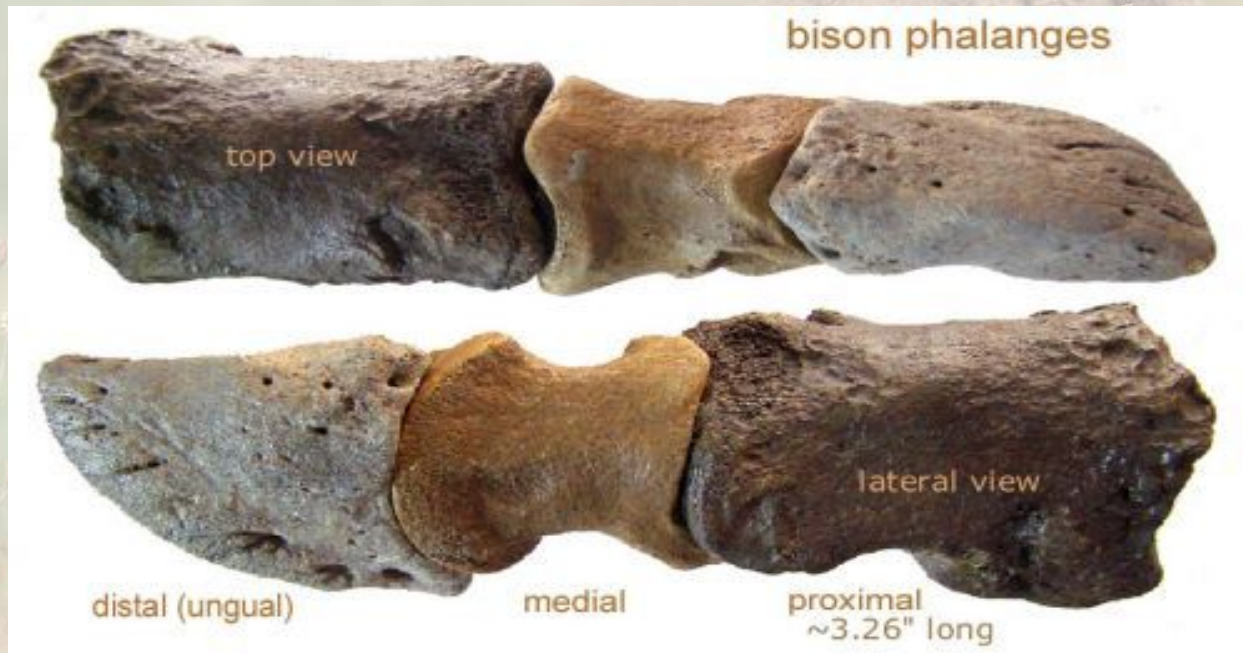


Photo Credit: <http://www.thefossilforum.com/index.php?gallery/image/27143-bison-phalanges/>

**Phalange (Bison toe bone):** on one end there are clear cut marks. **Cut marks** are usually caused by butchering. Although you have to be careful, sometimes cut marks can be caused by carnivores such as wolves or bears munching and gnawing on the bone! The greyish color of the bone suggests it was lying in an **anaerobic** (low oxygen) environment with low-iron: likely a marshy or wetland environment.

# Station 6 (continued)

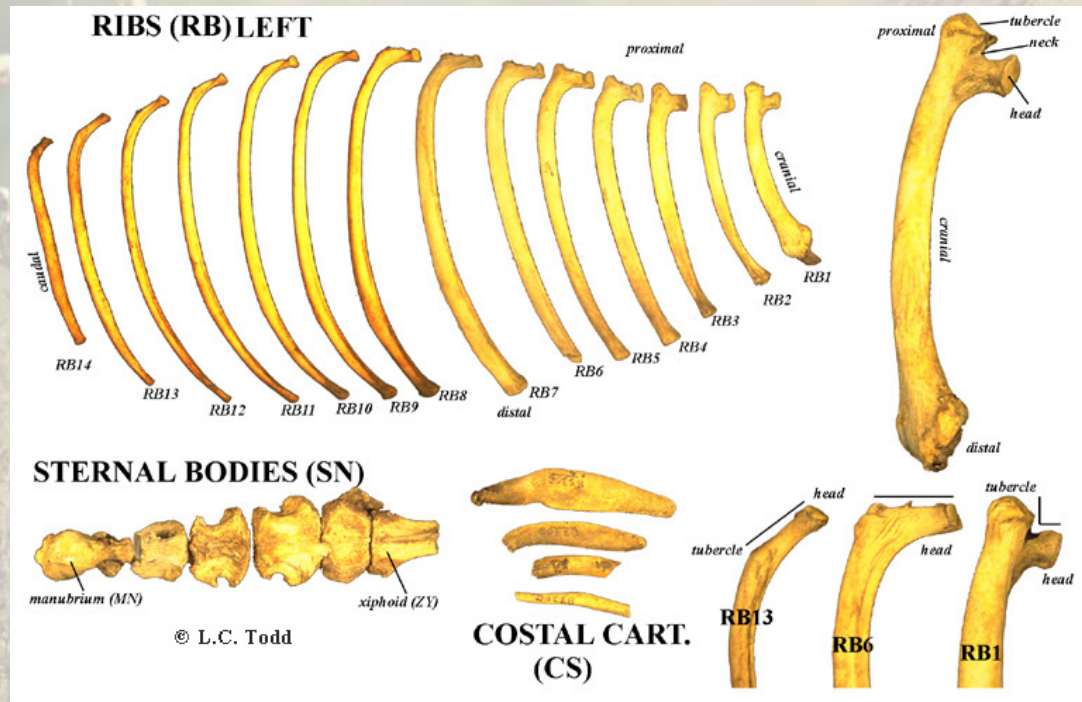


Photo Credit: Left: <http://anatomy.wikispaces.com/Ribs> Photo Credit: Left: <http://anatomy.wikispaces.com/Ribs> Right: <http://www.irwinator.com/126/p6.htm>

**Bison Rib:** this bone is broken at the midpoint and has several cut marks. **What do cut marks mean again???**

An **arrowhead** is next to it in the picture. Do you think the bone and arrowhead might be associated with each other?



# Station 7

*How an ulna could break and decompose:*

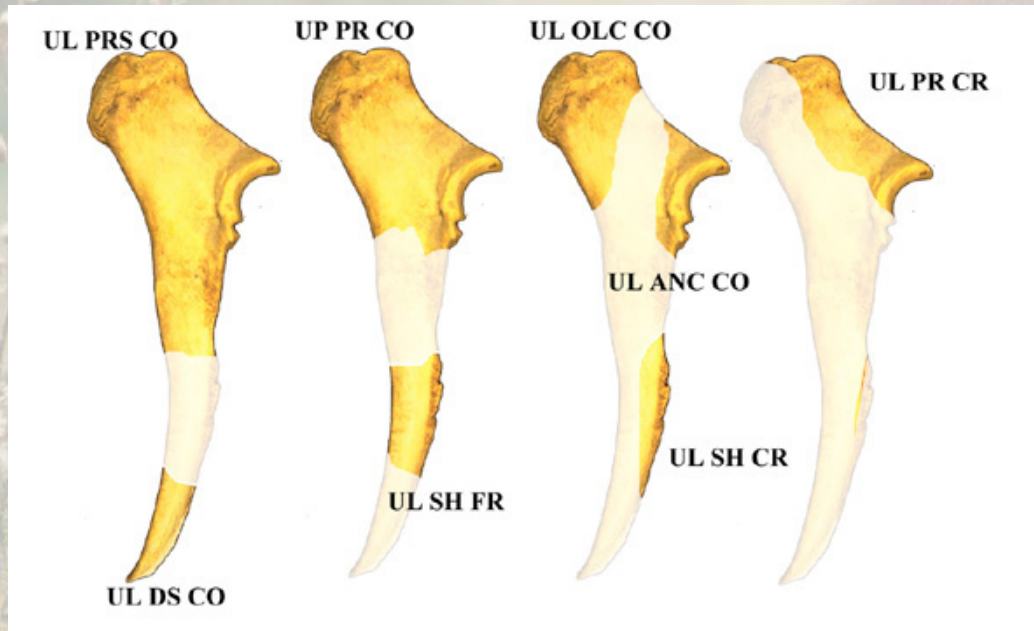


Photo Credit: Left: <http://lamar.colostate.edu/~lctodd/ulnapor.htm> Photo Credit: Left: <http://lamar.colostate.edu/~lctodd/ulnapor.htm> Top Right: <http://www.northseafossils.com/our-fossils/product/view/39/2220> Photo Credit: Left: <http://lamar.colostate.edu/~lctodd/ulnapor.htm> Top Right: <http://www.northseafossils.com/our-fossils/product/view/39/2220> Bottom Right: [http://www.digitalartform.com/archives/2004/12/comparative\\_ana.html](http://www.digitalartform.com/archives/2004/12/comparative_ana.html)

## Part of a ULNA or RADIUS (long bone)

This bone displays clear signs of breakage, possibly to extract the **marrow**: an extremely nutritious tissue that is high in fat found in bone. When food was scarce, Native populations would often extract the marrow from the bones to get a nutritious food source.