

Adventures in Classroom Archaeology

By

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1992

Published by:

Division of Archaeology
P. O. Box 44247
Baton Rouge, LA 70804

May 1999

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This publication has been funded in part with federal funds from the National Park Service, U.S. Department of the Interior, through the Department of Culture, Recreation and Tourism, Office of Cultural Development, Division of Archaeology. However, the contents and opinions do not necessarily reflect the views or policies of the Department of the Interior.

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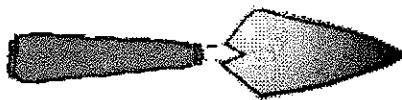
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Louisiana Prehistoric Indians

Grades: K-1



Grades: K-1

Subject: Plastic Projectile Points

Concepts:

- ▶ classification and observation
- ▶ archaeologists sort artifacts by style, raw material, and manufacturing techniques
- ▶ archaeology helps us learn about peoples in the past, their cultures, technologies, and adaptive behaviors

Materials:

- ▶ plastic margarine bowls or plastic folders
- ▶ templates of Louisiana stone points, page 4—enlarge template 130% to produce points of actual size (enlarging to legal size, 11x14, also yields actual point size)

Background:

The size of the points will be one way in which the children will classify them. The largest points are the oldest and were used for hunting large game such as extinct mammoths and mastodons, as well as extinct bison. The largest points were also attached to longer spears. As time passed, the larger animals disappeared. Thus, the smaller points were attached to shorter spears for hunting smaller game. The smallest points were used when the bow and arrow were introduced in Louisiana about 1,500 years ago (AD 400).

Activities:

As part of the archaeology learning center, the children may freely choose to play with, classify, and study the points as a naturalistic experience.

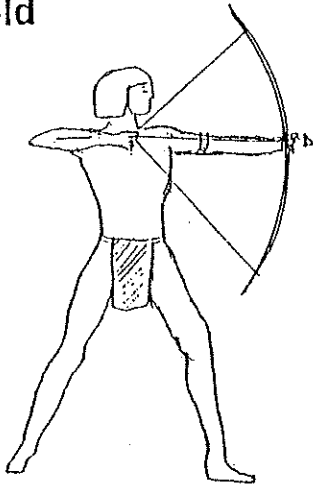
As a more structured experience, the teacher may divide the children into small groups. Each group will be given numerous points. The children will decide how to classify the points. Once they are through, the group of students will share their observations and reasons for classifying the points.

Extensions:

- ▶The children draw or write about a hunt using the points.
- ▶The students write a song about the hunt.
- ▶The class writes a big book about the points and/or the hunt.
- ▶The children trace the points and create their own pictures.

Louisiana Prehistoric Indians

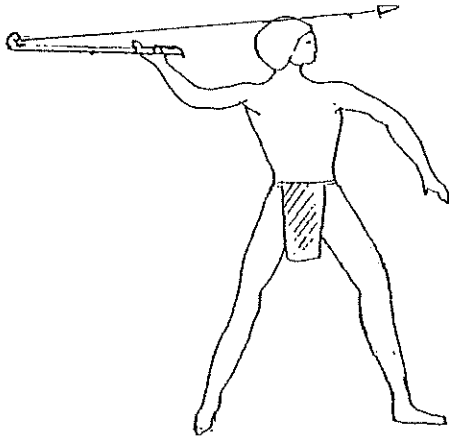
Late - old



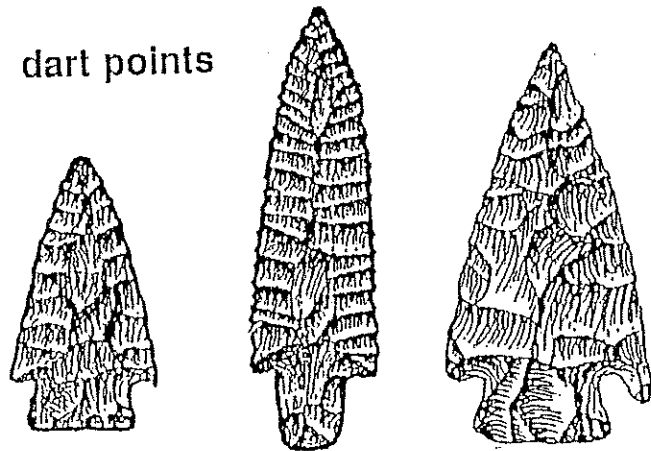
arrow points



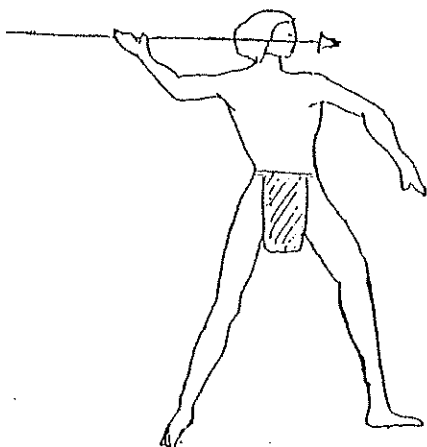
Middle - older



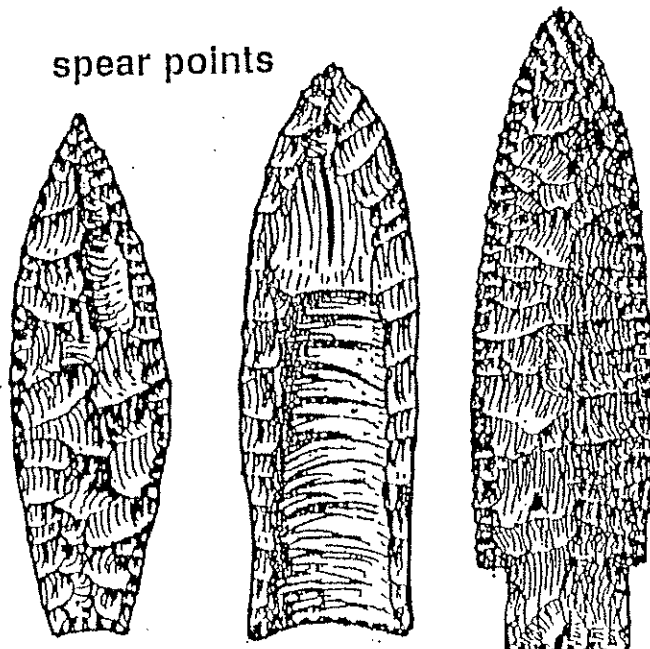
dart points



Early - oldest



spear points



Grades: K-1

Subject: Prehistoric Pottery

Concepts:

- ▶creativity
- ▶soil usage
- ▶prehistoric food storage

Materials:

- ▶various types of soils or clays (from store or backyard)
- ▶natural tools for decorating, i.e. twigs, pine straw, fingernails, pine cones, shells

Activities: The children will use various types of soils and clay to make their own pieces of pottery.

Two methods that can be used to manufacture a pot are listed below:

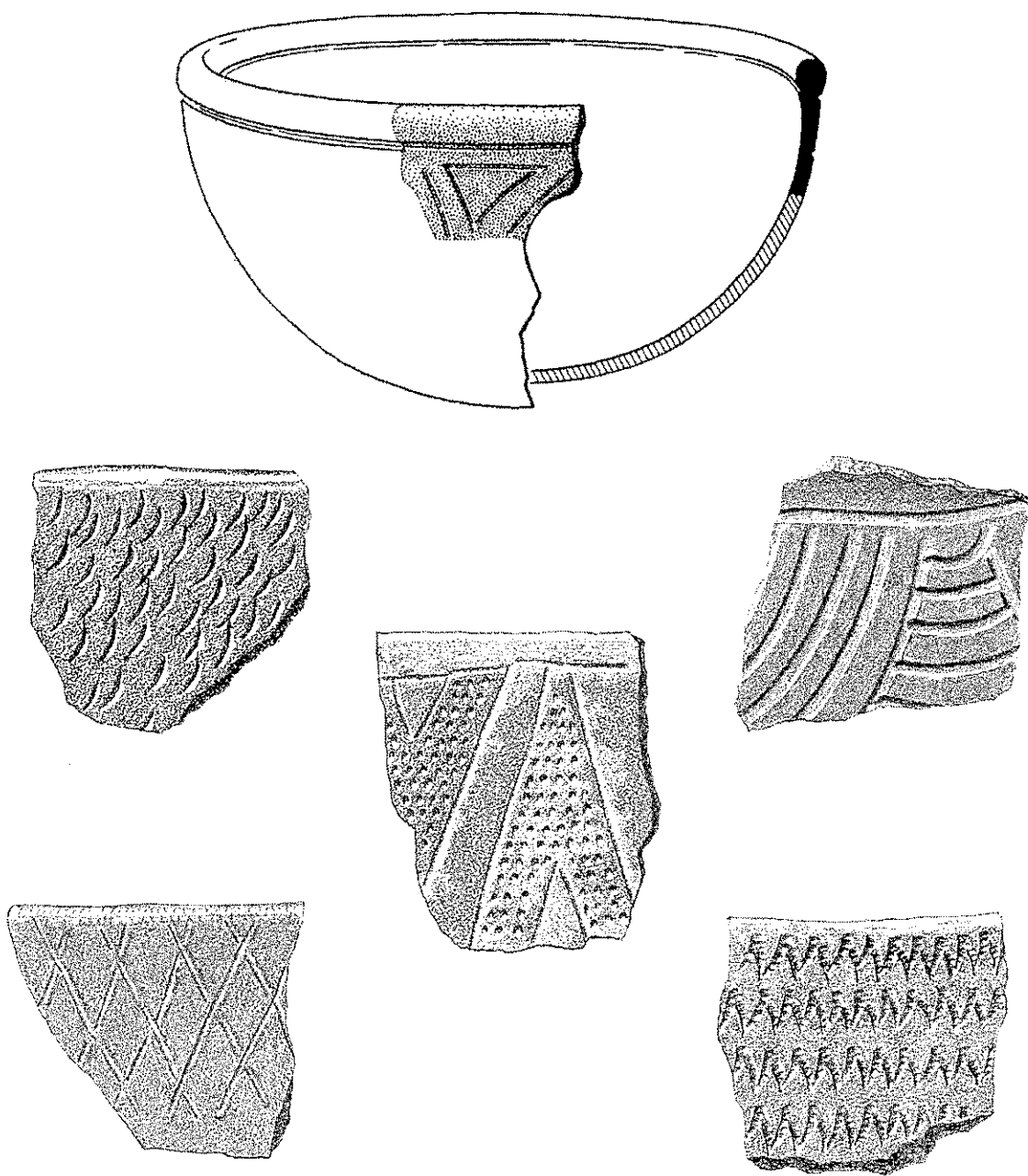
1. Coil Method - use a circle of clay to form a base or make a coil circle for base; then roll the clay into a coil and add to the base. (The coils should adhere to each other, but for the sake of experimentation, the teacher may choose to let the children discover their own techniques.) Once the pot is formed, smooth the sides so that the coils do not show.

2. Pinch Pot Method - begin with a ball of clay, mash the thumb in the center of the ball, work the clay up on the sides and shape into a pot.

The children may use any natural item they choose to decorate their pots. Examples of some decoration types employed by native cultures are shown on page 7.

The pots may be dried naturally by leaving them out in the open, or they may be fired in an oven or kiln. (Drying directly in the sun may cause cracking.)

This activity may also be used in the archaeology learning center. The children would play with clay or play-doh provided in the center. The pots would not have to be made to last, but could still be decorated using only natural tools set up in the center.



Images from:
 Phillips, Philip 1970 Archaeological Survey in the Lower Yazoo Basin, Mississippi, 1949-1955. Papers of the
 Peabody Museum of Archaeology and Ethnology, Vol. 60, Harvard University, Cambridge.

Grades: K-1

Subject: Match the Point

Concepts:

- ▶ oldest projectile points = largest
- ▶ oldest points used to hunt extinct animals
- ▶ identification and classification
- ▶ human adaptation to the environment

Materials:

- ▶ pictures of prehistoric mammals
- ▶ pictures of living animals
- ▶ plastic projectile points (used in previous lesson – ‘Plastic Projectile Points’)

Activities:

Each student, whether in a group or in a learning center, pretends to be an archaeologist. Actual stone points have been found in the bones of animals. Archaeologists identify both the animals and the points found at archaeological sites.

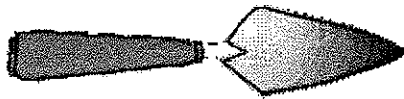
The students choose one large (older) plastic point and match it with one animal that would have been hunted by a prehistoric hunter. The correct picture will be that of an extinct prehistoric mammal. Suggestions for those found in Louisiana include the mammoth, dire wolf, saber-tooth tiger, ground sloth, horse, and tapir.

The small and medium plastic points will match with animals that are still alive today. Possible animals include rabbit, deer, and turkey.

As the larger prehistoric mammals became extinct, the need for the larger points diminished. Smaller animals evolved, and the size of the points also changed.

Techniques of Archaeology

Grades: 2-3



Grades: 2-3

Subject: Earth Cake

Concepts:

- ▶ stratification
- ▶ humans and dinosaurs DID NOT live at the same time
- ▶ archaeology is the scientific study of material remains left by people

Background: Recording all data is a necessary and important part of the archaeologist's work. In order to interpret a site and the human activity which was involved, the exact location of all artifacts is necessary.

Archaeologists are anthropologists who excavate to learn about people. Paleontologists are geologists who excavate to learn about fossils, such as those from dinosaurs.

Materials:

- ▶ three different colors of cake mixes, beans, or sand
- ▶ plastic people and dinosaurs or Flintstone vitamins

Activities: Prepare the cakes or cupcakes using three different colors. The bottom layer contains several dinosaurs. The middle layer is left plain to represent the passage of time. The top layer contains the people. A suggestion for preparing the earth cake is to bake each layer separately. Insert the people into the top layer (from the bottom) and the dinosaurs into the bottom layer (from the top) by hand. Use the same color icing as the middle layer of cake to hide the holes where the people/dinosaurs are inserted.

Divide the class into cooperative learning groups. Each group of students receives one part of the earth cake. Each student's excavation of the earth cake is a systematic investigation. Archaeologists use a grid system when investigating a site. The earth cake is the group's site.

One recommendation for site recording with this activity is the correlation of color with artifacts. The people and dinosaurs ARE NOT found in the same layer (color). The middle layer is plain because layers of earth were laid down for millions of years between the time of the dinosaurs and the time of humans. Students also need to record their absence of findings.

Data collected by each group of students could be shared through the drawing of charts as well as verbally. Interpretation of the data collected by the groups should relate the concept that dinosaurs and humans could not and did not live at the same time. Once the students have studied their sites, it will be quite obvious that the earth cake is forever changed.

The concept of archaeological sites as nonrenewable resources is easily and graphically reinforced.

Extensions:

- ▶ Students could draw a grid on their earth cake using icing pencils. Data collection would be more detailed and accurate.
- ▶ Students could measure the depth of the layers. Reinforcement of the brevity of humans in geologic time could be expressed by thickness of the different earth layers.
- ▶ Sites could also be made using three different types of beans, sand, or soil.

►Time lines can be constructed by the students using string and pictures indicative of certain geologic events to reinforce the millions of years between the dinosaurs and humans.

►Cartoons and pictures (like the Flintstones) could be used to discuss whether or not people were really living with dinosaurs. Students are frequently exposed to books and movies which show people and dinosaurs together. By using these same illustrations, the classroom teacher can reinforce the correct scientific concept that people and dinosaurs DID NOT live at the same time.

Grades: 2-3

Subject: How Was It Made?

Concepts:

- ▶ artifacts are made by people
- ▶ fossils, rocks, and minerals are made by nature
- ▶ archaeologists study artifacts to learn about the people who made them
- ▶ artifacts tell part of the story of the people who made them

Materials:

- ▶ modern and old human-made objects
- ▶ rocks
- ▶ fossils
- ▶ minerals
- ▶ shells

Background: If an article is a natural substance that has been modified by humans, it is an artifact. Archaeologists study artifacts and the people who made them. In some cases, only a specialist can tell whether or not humans modified a natural substance. For example, a broken rock could have been modified by humans to make a stone tool.

Activities: Have the students bring in both human-made and natural items (at least one of each). A classroom collection should then include fossils, rocks, shells, minerals, and both modern and old human-made items.

The students will decide upon a classification system and sort out the items. Once they have been sorted, discuss those items made by natural processes and those that are human-made.

Have the student choose one artifact and write about it, where it was found, and the people who made it. The students draw the artifact and mount their writings on their pictures. (The writings could be drawn from their imaginations or actually researched.)

Extensions:

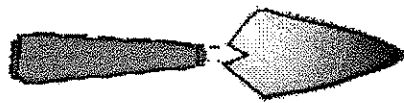
- ▶ Have the class conduct a survey about their favorite natural and human-made items from those in the class collection.
- ▶ Compose a class list of those questions they have about the human-made and natural items. Where could they go to get the answers? What type of scientist studies the items? Like archaeologists, students may have questions that cannot be answered.

Note:

If the actual items are unavailable, students can cut pictures out of old magazines and catalogs. The students could mount the objects on popsicle sticks or construction paper and continue with the activities.

Poverty Point

Grades: 4-5



Grades: 4-5

Subject: Poverty Point Cooking Objects

Concepts:

- ▶ prehistoric Indians - Louisiana people before Columbus
- ▶ prehistoric cooking
- ▶ recycling
- ▶ conservation of natural resources
- ▶ observation and prediction

Materials:

- ▶ clay
- ▶ soil (backyard, school, and/or various sources)

Background: These cooking objects are found in large numbers at the Poverty Point site near Epps, LA. Uniquely characteristic of the culture, they are made of soil found on the site and are called Poverty Point objects. Most fit into the palm of the hand.

Experimentation by archaeologists includes the manufacture of both the cooking balls and an earth oven. The cooking balls are made of wet soil. The basic biconical design is made by rolling the mud in a circular motion in the palms of the hands. The fingers should be bent at a 30 degree angle. Grooves can then be made with four fingers of one hand by squeezing the biconical ball. The biscuit design can be made by keeping the fingers of each hand parallel, rather than at the 30 degree angle.

The inhabitants of Poverty Point recycled the cooking balls. In addition, their use of the clay would have conserved firewood, a natural resource that could have easily been depleted over the long period that this site was occupied.

Activities:

Divide the class into cooperative learning groups. Give each group one Poverty Point cooking object and have them write down their observations. They will also make predictions on the purpose of the object.

After the groups have shared their observations and predictions, present the archaeological information concerning the Poverty Point cooking objects. (In Background section)

The students will manufacture their own cooking balls. Experimentation can be used to determine the successful methods of manufacturing and those soils which can best be used.

The basic six designs are illustrated on page 19. The cooking balls appear to be easy to make, but this is not necessarily the case. This can be an opportunity for class discussion on the prehistoric peoples' talents and aid in fostering student respect for all archaeological sites.

Extensions:

- Students write the directions for manufacturing Poverty Point cooking objects.
- Creative writing could include a day in the life of an inhabitant of Poverty Point or the experience of an archaeologist discovering the cooking objects.
- Prepare an earth oven and use the students' cooking balls to prepare a meal. The students' initials can very easily be carved into the wet clay after they finish making a cooking ball.

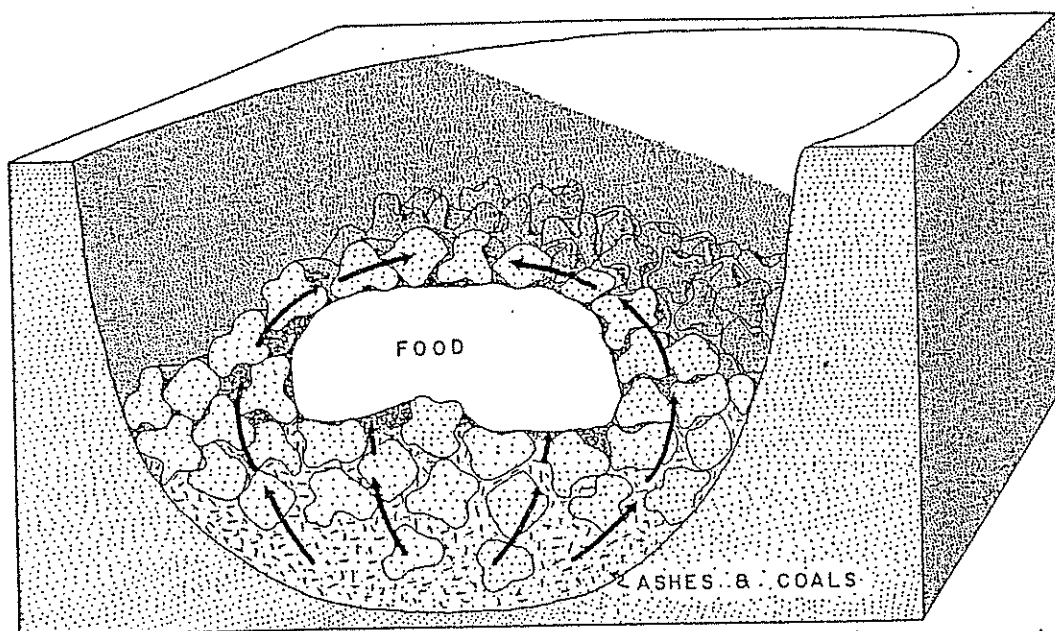
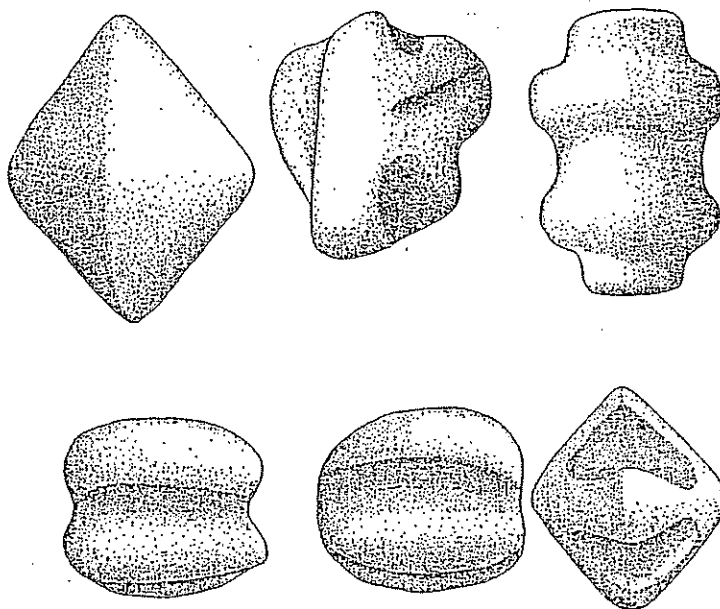
►An earth oven can be constructed based upon those researched by archaeologists studying the Poverty Point site. It should be round, 18-20 inches in diameter, and about 12 inches deep. After igniting a fire, allow it to get hot before placing (wet) balls into the oven. Additional wood can be added and burned to form hot coals (approximately 45 minutes). Remove some of the balls with two sticks and place the food in the oven. Prehistoric people would have wrapped the meat in organic materials such as palmetto leaves, but you may choose to use aluminum foil. Replace the hot balls with the sticks so that the food is between the layers of cooking balls. Additional small pieces of wood may be added and will form a layer of ash as the wood burns. Allow the food to cook.

Experiments by archaeologists using foil on three pounds of beef and two Irish potatoes resulted in cooked food after 1 1/4 hours. The time will vary depending upon the choice of food and wrappings.

Credit:

Directions and diagrams for the cooking objects used with permission from Donald G. Hunter.

Hunter, Donald G., 1975. "Functional Analyses of Poverty Point Clay Objects," *Florida Anthropologist*, (28:1), pp. 57-71.



Arrows indicate conduction of heat.



Grades: 4-5

Subject: Where in the World? 1500-1000 BC

Concepts:

- ▶ human needs and settlement worldwide
- ▶ Louisiana's rich cultural past
- ▶ reconstruction of past cultures from archaeological research
- ▶ archaeological sites are nonrenewable resources
- ▶ site protection is everybody's responsibility

Materials:

- ▶ encyclopedias
- ▶ research materials

Background: There are no written records of the people who populated Louisiana during this time period. Through archaeological excavations and interpretations, much has been learned about the prehistoric Indian settlement of Poverty Point in northeastern Louisiana.

The Poverty Point site is the main site of an entire culture of the Lower Mississippi Valley. This site had the largest, most elaborate earthworks anywhere in the western hemisphere. However, many Louisianians have never heard of Poverty Point. Through the efforts and research of archaeologists, its artifacts and uniqueness have been protected. Like any other archaeological site, Poverty Point is a nonrenewable resource.

Activities: Students will research the events taking place around the world at approximately 1000 BC.

The Poverty Point site would be researched by one group of students. Suggested areas of study for the other groups in the class might include:

- a) Phoenicians of the Mediterranean
- b) Hittites of the Middle East
- c) Rameses II of Egypt
- d) David and Solomon of Israel
- e) Greek Bronze Age - Helladic Civilization
- f) Shang Dynasty of China

The people of all of the areas studied had some common needs and interests. Through student research and study, a growing appreciation for our state and its archaeological richness should be apparent. In addition, our ties to the past and the urgency of protecting archaeological sites are other important messages to be shared with the students.

Use the K-W-L comprehension strategy (Ogle, 1986) to monitor the students' understanding of the Poverty Point way of life.

K= What do the students know?

W= What do the students want to know? (Similar to archaeologists' questions, such as what did they wear, what did they look like, how did they raise their young, what happened to these people?)

L= What did the students learn? (Possibilities include responses such as mound building was difficult and took much time and community effort. The Poverty Point site was the major governmental and social hub for the entire culture unit. Some questions still remain unanswered.)

After all research is completed, the class composes a compare and contrast chart with data from each group's research report.

Note:

The more students generate the ideas for research, the more they will be involved. If this is the last lesson, then much of Poverty Point has been studied. Therefore, students may choose to research the other areas and compare them to Poverty Point.

References:

Available at public libraries are booklets in the Anthropological Study Series. Number 7 is the publication, Poverty Point, by Jon L. Gibson (1983).

Also available at the library and for sale through L.S.U. Geoscience Publications is The Poverty Point Culture, by Clarence H. Webb (1977).

Peoples and Places of the Past: The National Geographic Illustrated Cultural Atlas of the Ancient World, 1983.

Ogle, D.M. (1986). K-W-L: A teaching model that develops active reading of expository text. The Reading Teacher, 39(6), 564-570.

Grades: 4-5

Subject: Prehistoric Architecture

Concepts:

- ▶ prehistoric people met their basic needs in culturally distinct ways
- ▶ Louisiana prehistoric people DID NOT live in tepees
- ▶ archaeological sites are nonrenewable resources and show how prehistoric and historic people lived
- ▶ all people depend upon natural resources
- ▶ archaeologists use special scientific and technical methods of analysis

Materials:

- ▶ paper
- ▶ pencils

Background: Prehistoric people had the same basic needs that we have now: food, clothing, shelter. The natural resources in the area influenced their preferences in meeting these basic needs. Through archaeology, we can find out how houses in the past were built. Evidence shows that houses of the Poverty Point time period were wattle and daub. The structures were circular. Vertical posts were put in the ground (like fence posts). The walls were made from green branches woven around the posts. The woven branch framework is called wattle.

Daub is mud sometimes mixed with grass. The daub was applied to the walls. The roof of the house probably was made of grass and/or palmetto leaves. This is all that the archaeologists know about the houses.

Activities:

Each cooperative learning group creates a concept web on prehistoric people and their houses. Possible answers may include tepees, hogans, huts, cliffs, and caves.

Once the webs have been completed, each group of students will share their web. The class should discuss the environmental issues that need to be considered for each type of housing. (Such as the impossibility of caves or cliff dwellings in Louisiana.) If none of the groups chose it, introduce the students to the circular house.

Each group will design and draw a house model for a Poverty Point family. Decisions need to be made on the following:

1. exterior covering (grass, palmetto, mats, skins, mud) of walls and roof
2. size and type of door
3. size and type of cooking/heating area (How will it vent?)
4. size of structure
5. shape at top (conical or round)

Extensions:

- Each group of students makes a model of the house they designed.
- The lesson could also include models of Indian houses around the country.

Grades: 4-5

Subject: How Many Baskets to Build a Mound?

Concepts:

- ▶ pride in a famous Louisiana site
- ▶ respect for prehistoric people
- ▶ appreciation for the complexity of mound building
- ▶ understanding that prehistoric people exhibited social and political organization

Materials:

- ▶ paper
- ▶ soil
- ▶ measuring cups or tablespoons

Background: The Poverty Point site at Epps, LA has six concentric half-circle ridges. Each ridge is four to six feet tall and 50 to 150 feet wide. The interior arc is 1,950 feet across and the exterior is nearly three-quarters of a mile. There are also mounds, including Mound A, or the “bird” mound, Motley mound, and Mound B.

Mound A is referred to as the “bird” mound by archaeologists because of its shape. The bird appears to face west, measures 710 feet by 640 feet at the base, and is 70 feet high. The presence of a ramp and platform suggest that this mound was used for ceremonies.

The overall volume of earth needed to construct this mound is 300,000 cubic yards. Archaeologists found evidence of basketry, or matting impressions, around loads of earth. The occupants are believed to have built the earthworks at Poverty Point by carrying single baskets of earth weighing up to 50 pounds. Borrow pits where some of the earth was dug are located close to Mound A.

Activities:

In order for the students to gain greater understanding and appreciation for this site, the following questions could be assigned to cooperative learning groups.

1. How does the height of your school compare with the bird mound? (ten feet = approximately one story)
2. How long and how wide is your school? How does that compare to the size of the base of the bird mound?
3. How big is your school property compared to the size of the ridge area at Poverty Point?

Each group will record and present its data. Any differences in results should be discussed and conclusions drawn. (Class Average)

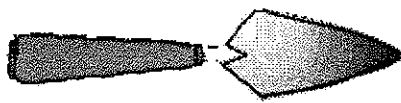
Additional group work focuses on the human construction of such massive earthworks. Each group is responsible for one part of constructing a scale model of the Poverty Point site. Issues the groups need to address include:

1. The types of construction methods to be used (ratio of baskets to tablespoons or cups).
2. Time needed to construct their part.
3. This is a community effort - the groups are working together on a class project.
4. Using organizational skills and strategies - each student within the group has specific responsibilities.
5. Other factors the students themselves will determine and include (Encourage students to document all work - either in reports and/or journals).

Note:

This lesson is not meant to be a competitive one. It should help illustrate the various techniques and considerations involved in mound building and should aid in development of student respect for the prehistoric people of Louisiana and the magnificent earthworks they left behind. This site, like all archaeological sites is a nonrenewable resource. Because of the continued work of archaeologists, we have the opportunity to study the cultures of prehistoric people. We are all responsible for the preservation of these sites.

Louisiana History



Subject: Louisiana Cultural Mysteries

Concepts:

- ▶ cultural traits change over time
- ▶ archaeologists study cultural changes
- ▶ material remains of a culture help determine the age of a site

Materials:

- ▶ pictures
- ▶ shoeboxes
- ▶ paper
- ▶ pencil

Activities: Divide the class into six groups. Each group will stay at its station for approximately five minutes. The students will rotate until all groups have been to all six stations.

The stations may be labeled with the same letter that appears at the bottom of the pictures. All four pictures with the same letter go in one shoebox kit.

During the five minutes that one group is at its station, the students record the facts that they observe from the pictures. After every group has worked with all six stations, the students decide on the chronological order of the six cultures represented by the shoebox kits.

A class chart can be made listing the six cultures using categories such as food sources, shelter, tools/weapons, pottery, and miscellaneous. Another suggestion is to allow students to generate the categories themselves as well as determine their own record-keeping procedures.

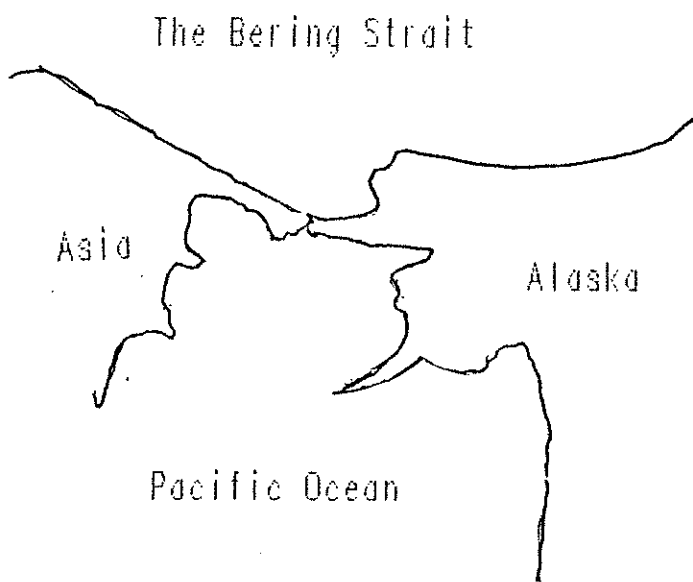
Give the students the correct time periods. Through class discussion and/or writing assignments, the students can relate some conclusions about what life was like during each period.

The correct chronological order is:

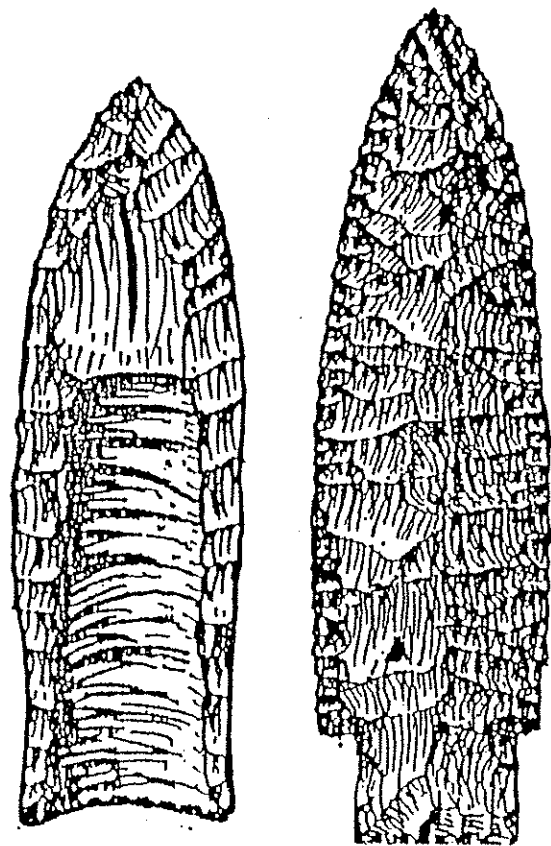
Label	Culture	Beginning	End
P	Paleo-Indian	10,000 BC	6000 BC
M	Meso-Indian	6000 BC	2000 BC
Pt	Poverty Point	2000 BC	500 BC
TM	Tchefuncte/Marksville	500 BC	AD 400
C	Temple Mounds	AD 400	AD 1540
EC	European Contact	AD 1540	AD 1800

Extension:

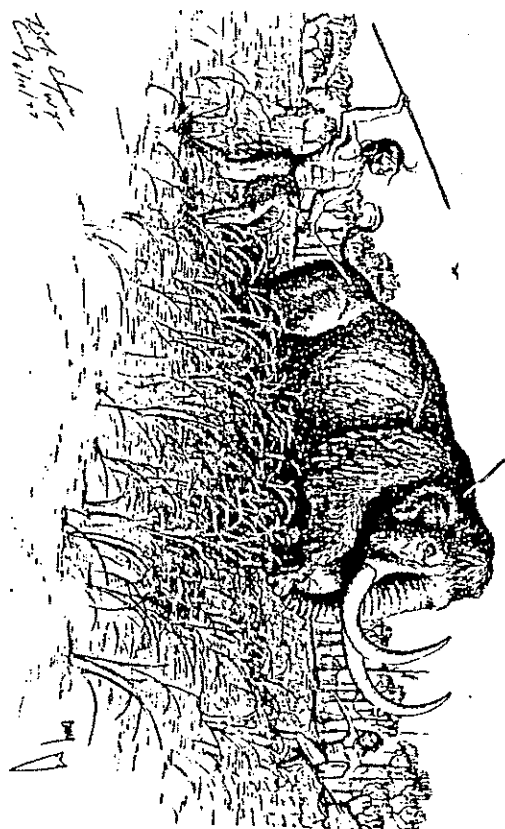
►The writing assignments suggested in the activity section can be expanded into larger projects. Group research or replication of artifacts from the six culture periods can be assigned.



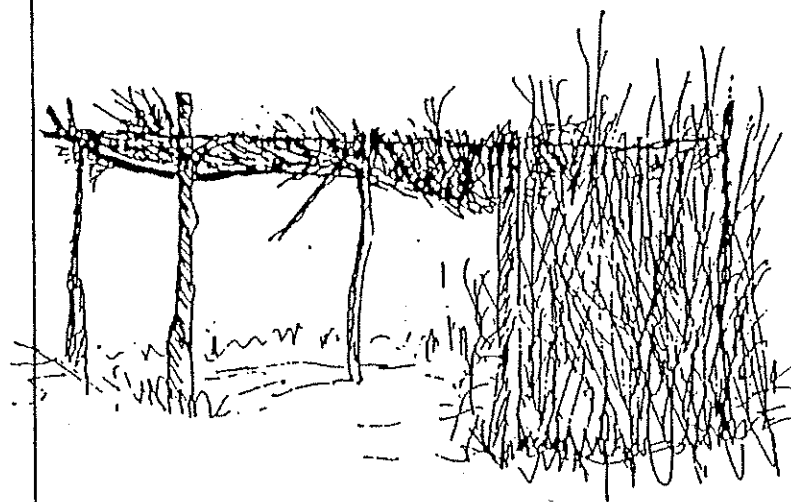
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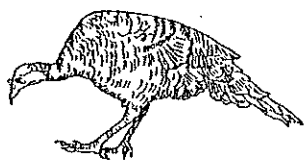
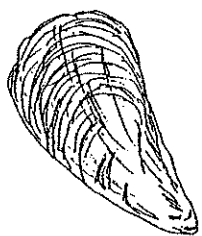
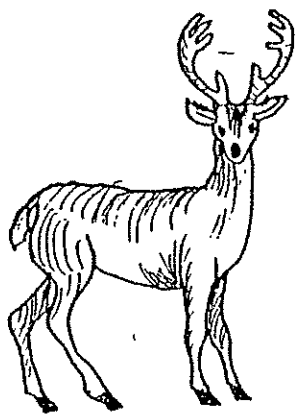
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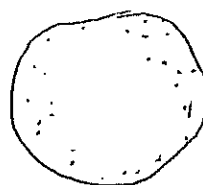
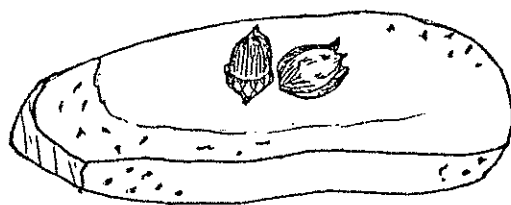
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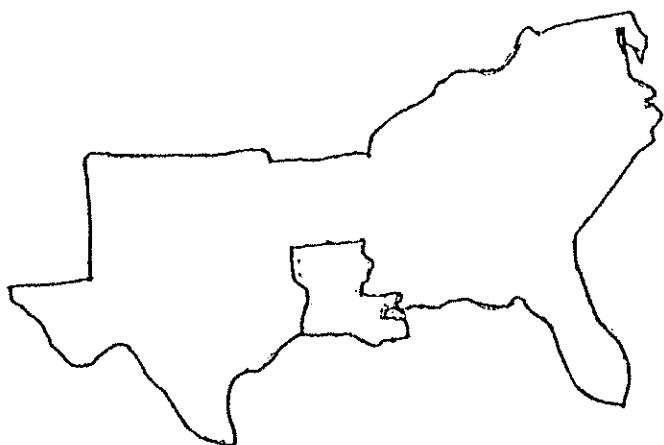
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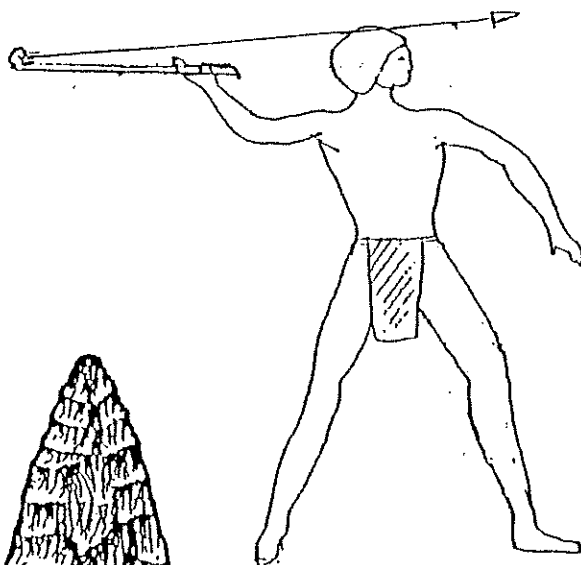
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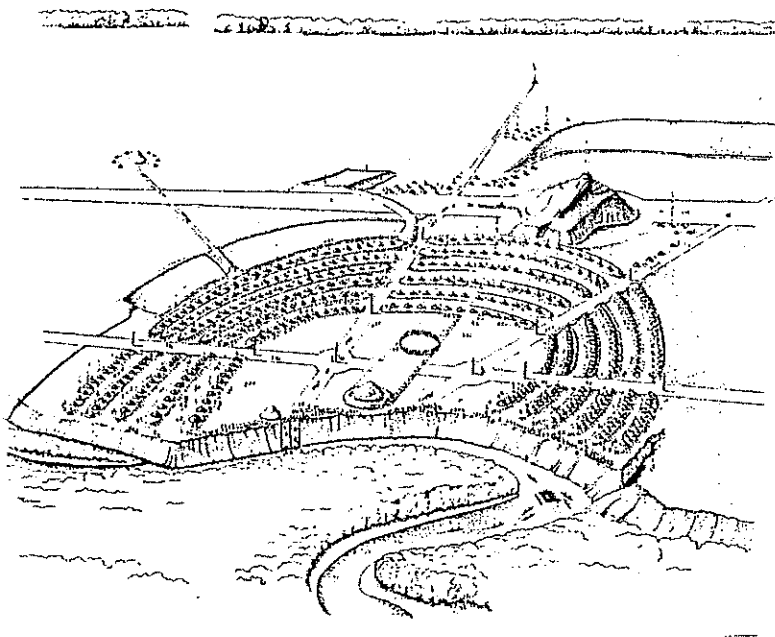
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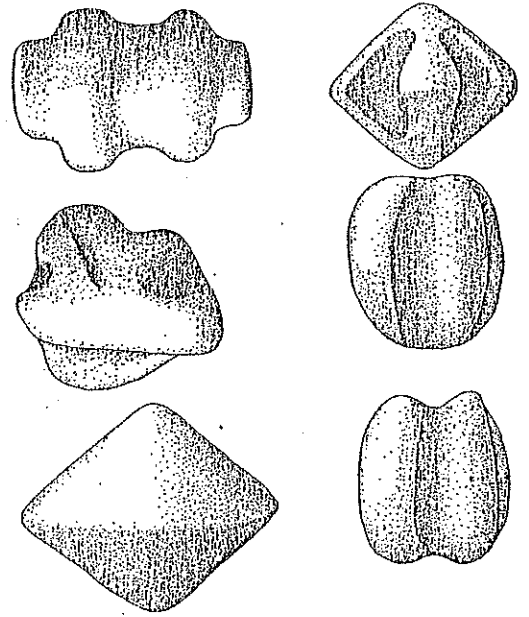
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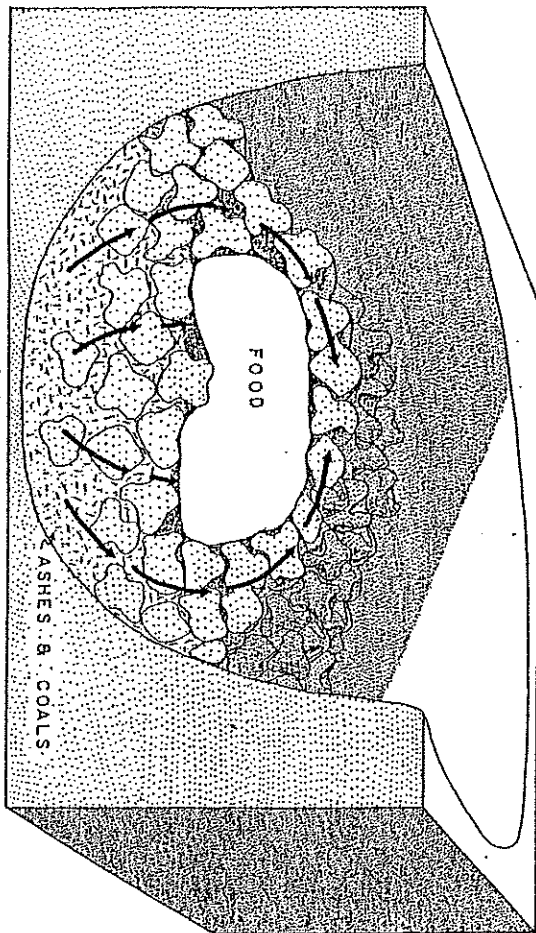
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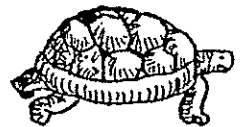
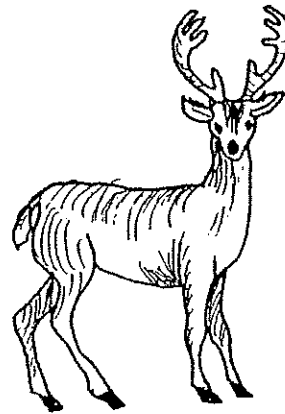
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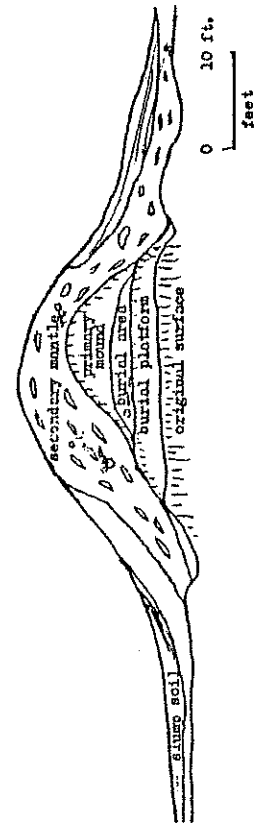
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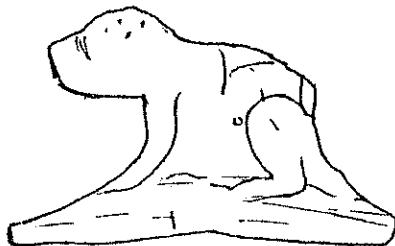
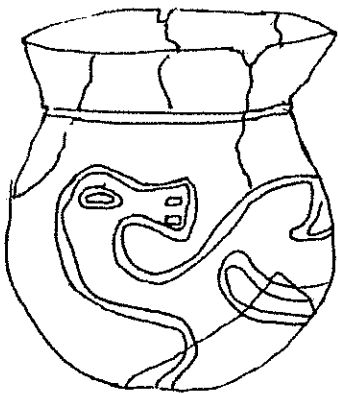
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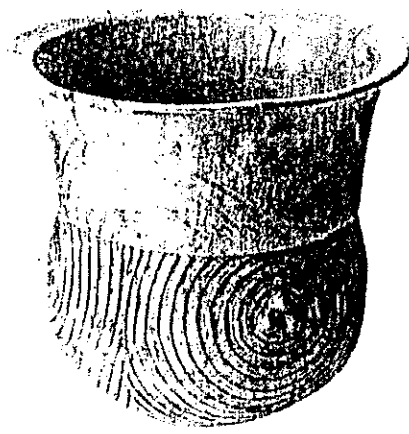
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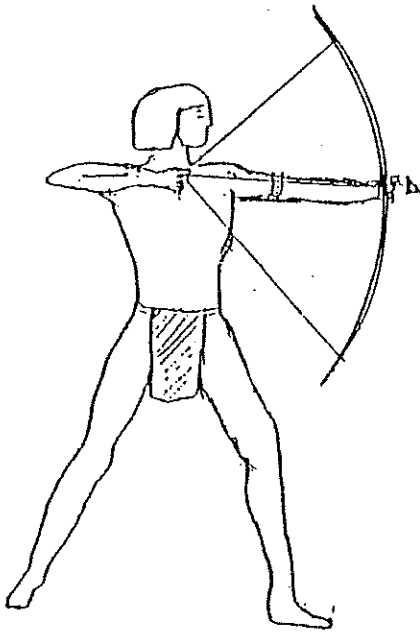
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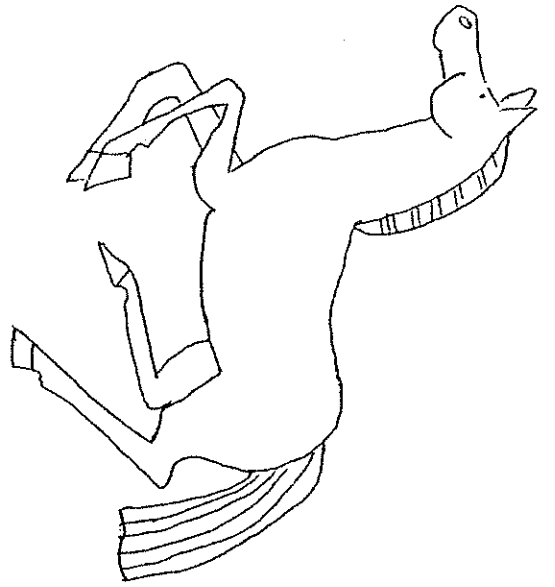
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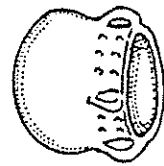
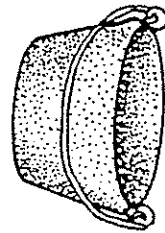
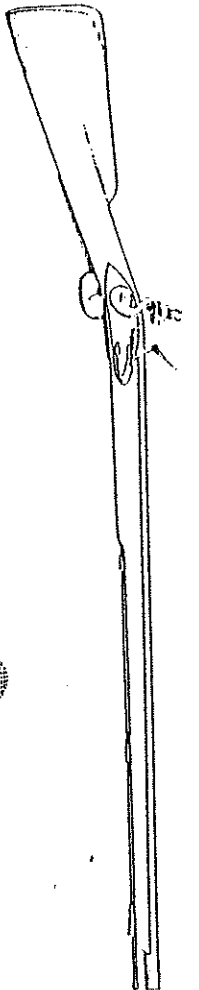
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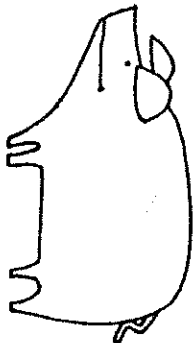
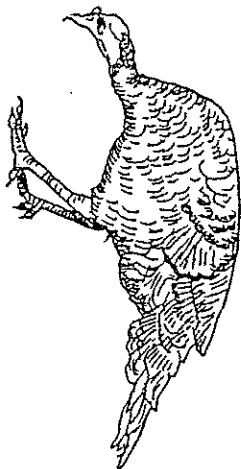
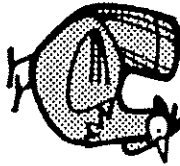
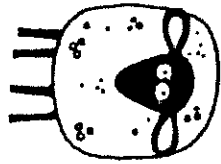
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EO



EO

Subject: Today's Artifacts

- Concepts:**
- ▶ archaeologists study cultures by artifact analysis
 - ▶ artifacts tell about cultures
 - ▶ creative, descriptive, and analytical thinking
 - ▶ observation skills

- Materials:**
- ▶ class sets of five artifacts
 - ▶ paper
 - ▶ pencil

Activities: Divide the class into cooperative learning groups. Each group of students will have a set of five artifacts to analyze. Students need to be able to handle and closely examine the artifacts. Suggested artifacts for class kits include coins, pop top tabs, records, kitchen utensils, religious jewelry or figurines, and toys. Label each artifact with an identifying number or letter.

Have each student select an artifact and write a description of the appearance of the artifact. For example, artifact #16 (a record) might be described as a "black flat circular disc with grooves on both sides." Next, have the students assign a function to the artifact they described.

Now, have the students pretend they are archaeologists in the year 3000 who know very little about twentieth-century life in Louisiana. The conclusions that they draw about these artifacts and their usage should be logical, but may be completely untrue. For example, #16 could have been used as a recreational object to throw between two people or a wheel on a child's cart. Encourage students to be creative without being ridiculous.

Students should draw conclusions about the culture based on the artifacts analyzed. Once again, the ideas should be logical, but not necessarily correct. The conclusions should be drawn from all five artifacts studied together.

Lead a discussion about the activity and include:

1. What did students learn about how archaeologists draw conclusions?
2. How was the activity similar to the way an archaeologist works? (Like archaeologists, the students described the artifact's appearance, function, and what it showed about the culture.)
3. How was the activity unlike real archaeological work?
Ordinarily, when archaeologists study artifacts from a site they:
 - a) look at more than 5 artifacts
 - b) compare the findings with those from other sites
 - c) know about features at the site (examples of features are house floors, storage pits, fire hearths or cooking pits)
 - d) know the context of the artifacts (the interrelated conditions in which a site, artifact, or feature occurs)
 - e) are very conservative when they suggest artifact function and what the artifacts tell about the culture

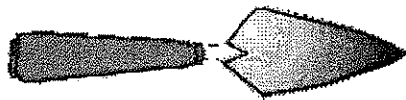
Extension:

- Have each group create a list of five artifacts from a space station or newly explored planet. Repeat the above activity.

Reading:

- Motel of the Mysteries by David Macaulay (1979) Houghton Mifflin Co., ISBN 0-395-28425-2.
- Unique interpretations of modern artifacts by archaeologists of the future.

Earth Science



Subject: Avery Island: Archaeology and Geology of Louisiana

Concepts:

- ▶ basic human needs span across time
- ▶ archaeologists use careful methods to record and excavate sites
- ▶ stratigraphy helps establish relative chronology
- ▶ material remains that people leave behind reflect their culture
- ▶ the Americas have been home to hundreds of cultures for at least 12,000 years

Materials:

- ▶ group hand-outs or overheads
- ▶ paper
- ▶ pencil

Background:

Using Figures 1 and 2, discuss the distribution of the principal saline areas in the eastern part of the United States. In this region, Native Americans obtained most of their salt from brine springs. An extensive rock salt deposit, called the Salina Basin, underlies states bordering the Great Lakes. Salines emerge in Illinois, Missouri, Kentucky, Ohio, New York, West Virginia, Tennessee, and Virginia. Another rock salt deposit, called the Gulf Coast Basin, lies deeply buried beneath the Gulf Coast states. Rich brine has come to the surface in many salines in Louisiana, Alabama, Texas, and Arkansas. An important saline, in terms of the history of the salt industry in the United States, is on the Avery Island salt dome in south-central Louisiana.

Explain that Avery Island is higher than the surrounding marsh because sediments have been uplifted by the salt plug. Uplift has occurred since the late Pleistocene and probably is still active at present. Future periods of geomorphic and tectonic instability are possible (Autin, McCulloh, & Davison 1986). On the topographic map (Figure 3), point out the two clusters of buildings along the north/south road. The northern group is the McIlhenny Company, producer of the famous TABASCO brand pepper sauce; the southern group is Akzo Salt, Inc.

In the process of searching for salt on the island, people have found fossilized bones of extinct vertebrate animals. The bones came from mammoth, mastodon, saber-tooth tiger, ancient horse, and giant bison. These plant-eating animals probably came to the area to get the salt they needed.

Native Americans also visited the area over thousands of years. Archaeologists studying Avery Island have even found that prehistoric Native Americans produced salt there. They heated brine in shallow ceramic bowls. After the water evaporated, they scraped out the salt and packed it into small ceramic cups. They took the salt in these small pots to other areas for trade.

Activities:

- Ask the class to list the basic nutritional needs of all people. One mineral which all humans need, but that may have been overlooked, is salt. Once the discussion is focused on salt, divide the class into small groups. Give the groups about five minutes to list ways that salt can be acquired. Next, have the groups share their ideas. Encourage discussion of ways humans interact with their environment and geographic location to get salt. (Even going to a local supermarket relates to a person's geographic location.)

Ask the students to list ways prehistoric Native Americans could have gotten their salt. Then tell them about the observations of members of the de Soto expedition, which traveled in the southeastern United States between 1539 and 1543.

The travelers recorded four ways that the Native Americans were extracting salt:

1. from the ashes of plants
2. from salt-impregnated sand
3. from brine water at salines
4. gathered in a free state as rock salt

Additionally, some coastal Native Americans boiled seawater to obtain salt. Indian merchants traded salt to other groups and to European explorers.

Have student groups interpret the topographic map of Avery Island (Figure 3) using the following as suggested questions:

1. What is the contour interval? (5 feet)
2. What is the highest point on the island? (155 feet, near the "WT" in the northeast part of the island)
3. What is the elevation of the surrounding marsh? (less than 5 feet)
4. What are some of the natural features? (ponds, hills)
5. What are some of the human-made features? (gas wells, jungle gardens)
6. Why do you think this salt dome is referred to as an "island"? (it stands out from the surrounding area)

Have the students examine Figures 4 and 5. Figure 4 is a cross-section of a salt mine showing the stratigraphy of one area of the island where archaeologists removed three soil cores. Figure 5 shows the details of what was found in one core, referred to as Bore Hole B.

Ask the students to answer and discuss the following questions:

1. What is the oldest (deepest) deposit? (salt)
2. Where were the fossil bones from extinct animals found? (in Bore Hole B, just above the salt)
3. Where was Native American pottery found? (between 5 and 10 feet above MGL; level 7 on the top figure)
4. Where were historical artifacts found? (near the top)
5. Assuming this is an undisturbed area, were people using pottery at the site at the same time the extinct animals lived there? (no; the extinct animals were there first)

Extensions:

- Why do herbivorous animals and vegetarian people need more salt than meat-eaters? In history or prehistory, whenever there was a reliance on agricultural products (rather than animal foods), there was a need for salt to supplement the diet. What happens to a person who does not get enough salt? What happens when a person gets too much salt?
- Research the historical use of salt as payment. For example, the word salary comes from a Latin term meaning salt money; it was payment to Roman soldiers so they could buy salt. Several countries once taxed salt. Discuss the meaning of saying "He's not worth his salt."
- Identify natural sources of salt in your area.

References:

Autin, W., McCulloh, & Davidson, A., (1986). Quaternary Geology of Avery Island, Louisiana. Gulf Coast Association of Geological Societies Transactions, 36:379-389.

Brown, I.W., (1981). The role of salt in eastern North American Prehistory. Anthropological Study Series No. 3, Louisiana Department of Culture, Recreation and Tourism, Louisiana Archaeological Survey and Antiquities Commission.

Gagliano, S.M., (1964). An Archaeological Survey of Avery Island. Baton Rouge, LA: Coastal Studies Institute.

Gagliano, S.M., (1967). Occupation sequence at Avery Island. Coastal Study Series No. 22., Baton Rouge, LA: Louisiana State University Press.

Please note that Avery Island is private property and may only be entered by special permission of Avery Island Inc.

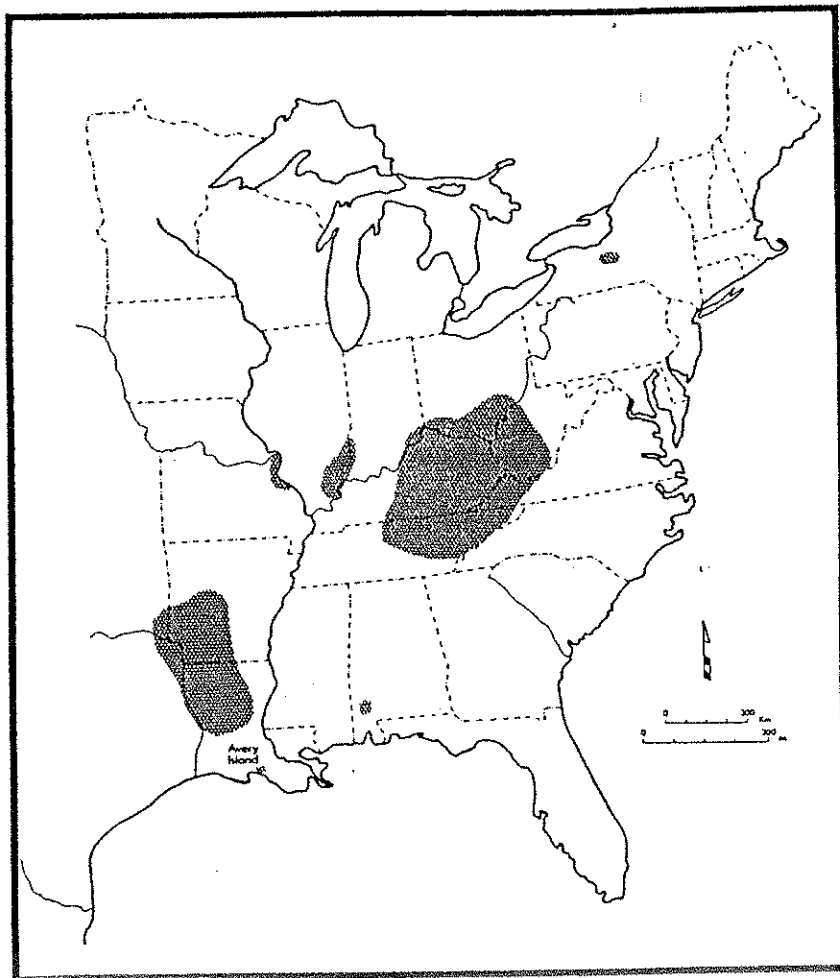


Figure 1: Principal Saline Areas in Eastern North America

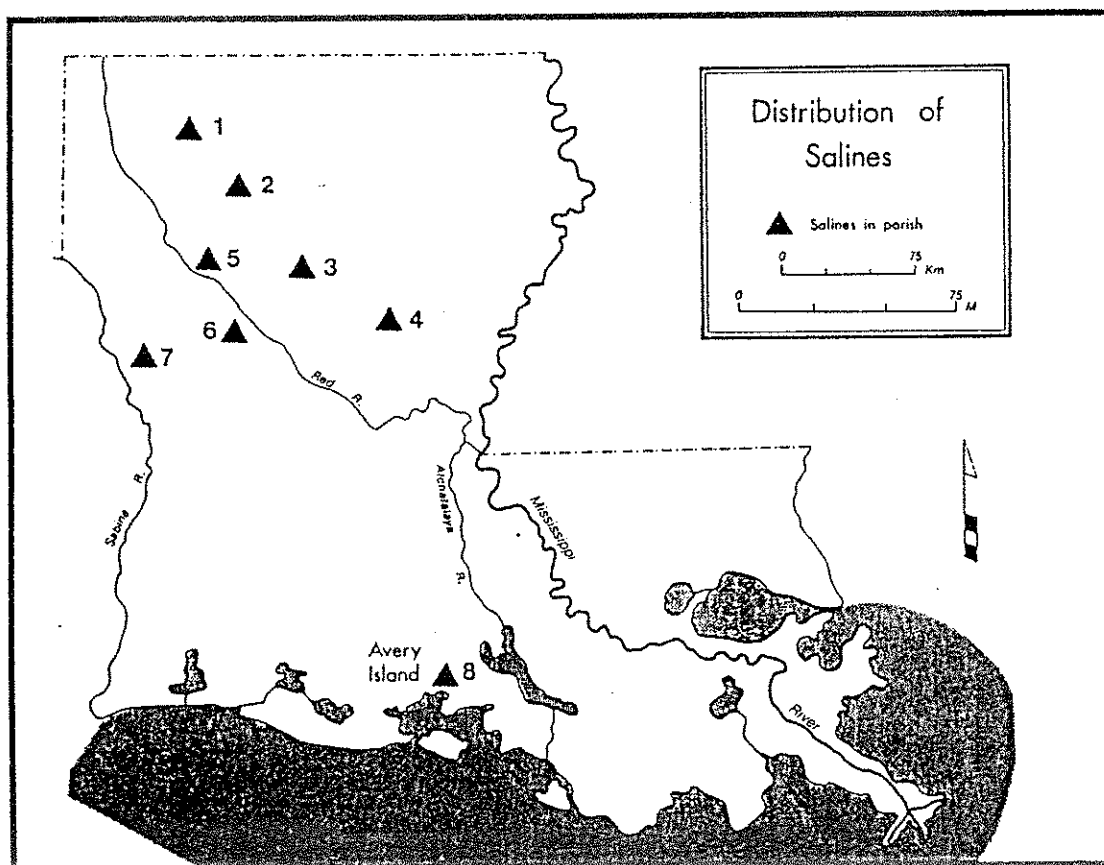
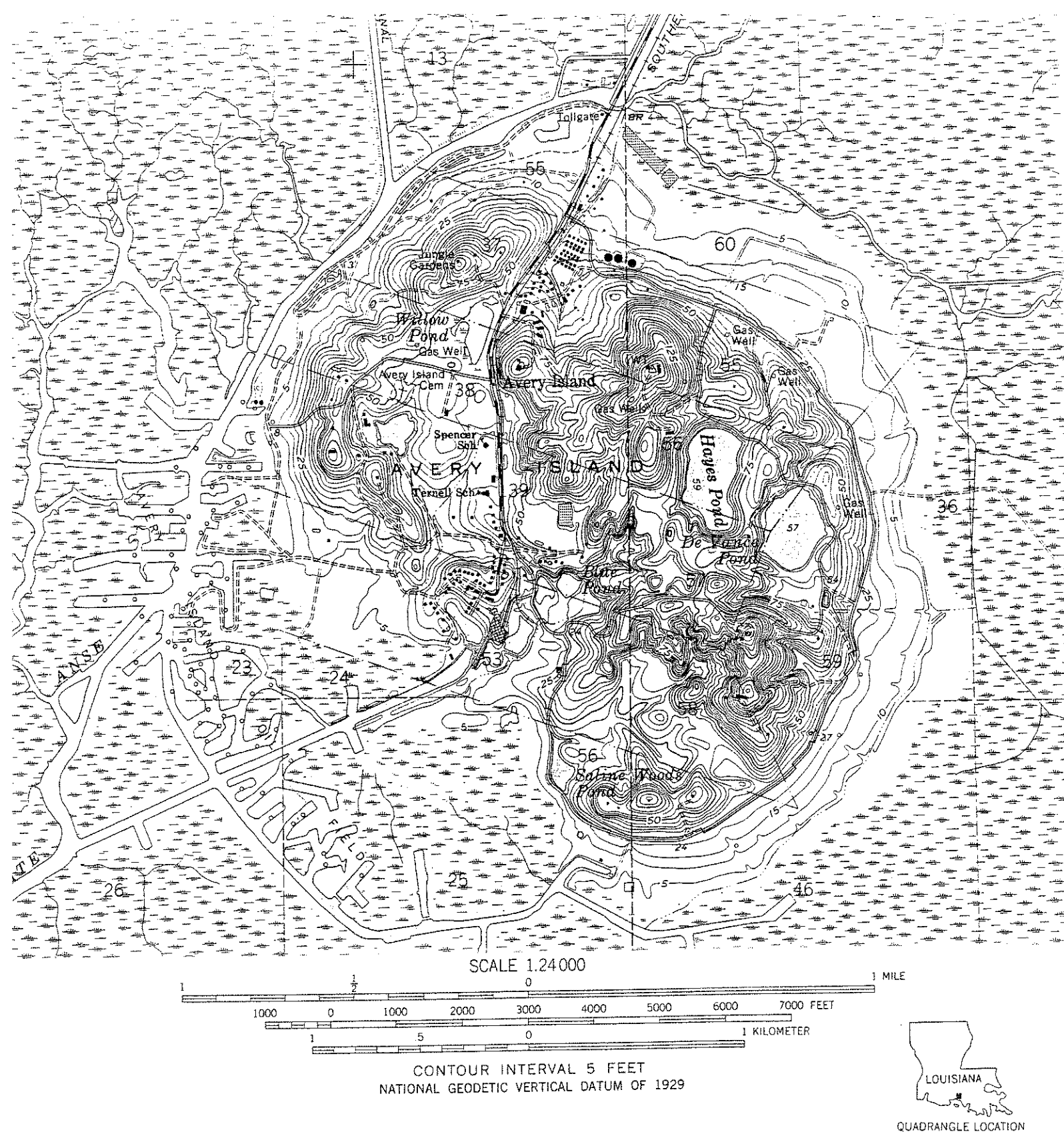


Figure 2: Salines in Louisiana, by Parishes: 1, Webster; 2, Bienville; 3, Winn; 4, LaSalle; 5, Red River; 6, Natchitoches; 7, Sabine; 8, Iberia



THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
 FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
 AND STATE OF LOUISIANA, DEPARTMENT OF PUBLIC WORKS, BATON ROUGE, LOUISIANA 70804
 A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Figure 3: Topographic Map of Avery Island

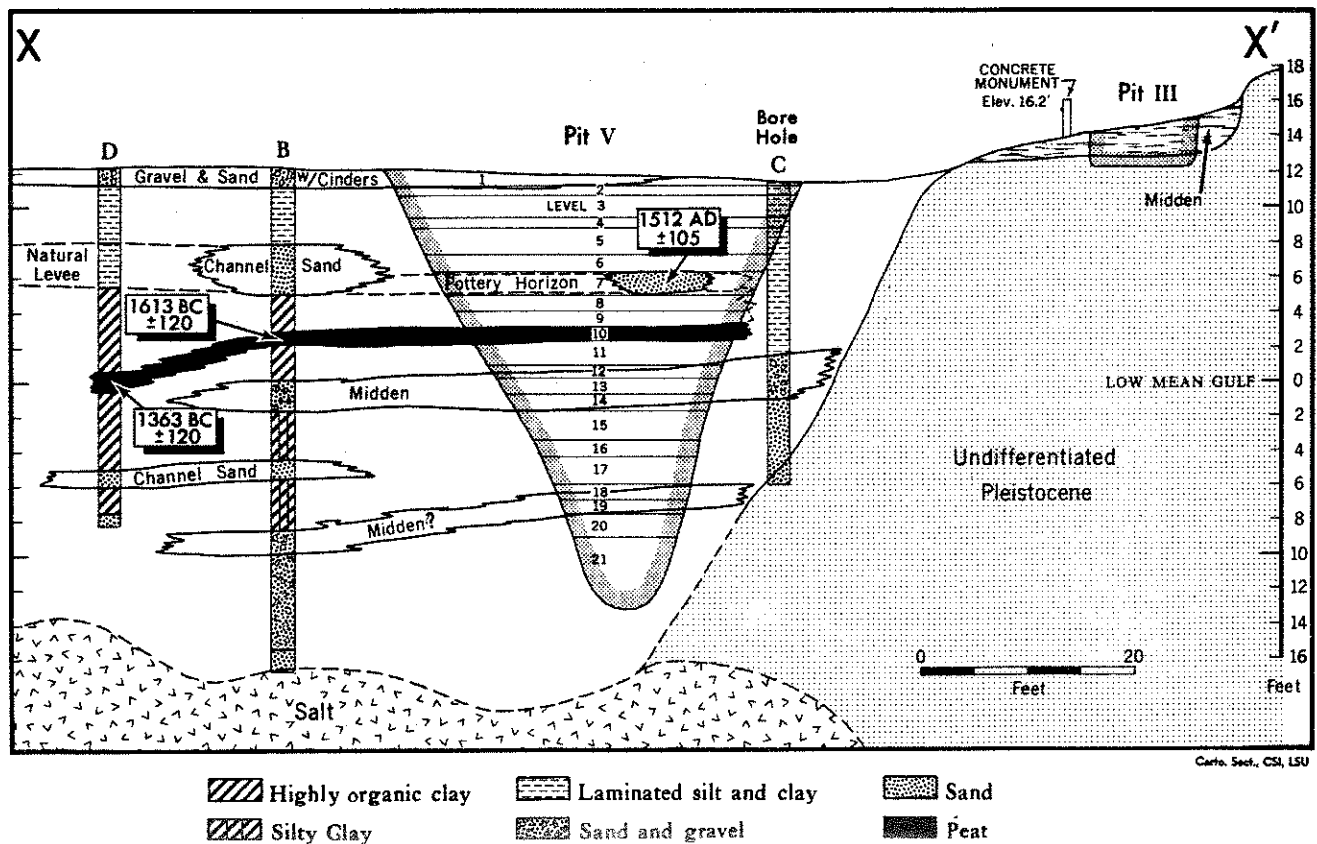


Figure 4: Cross-section Showing Stratigraphy of Fill in Salt Mine Valley on Avery Island

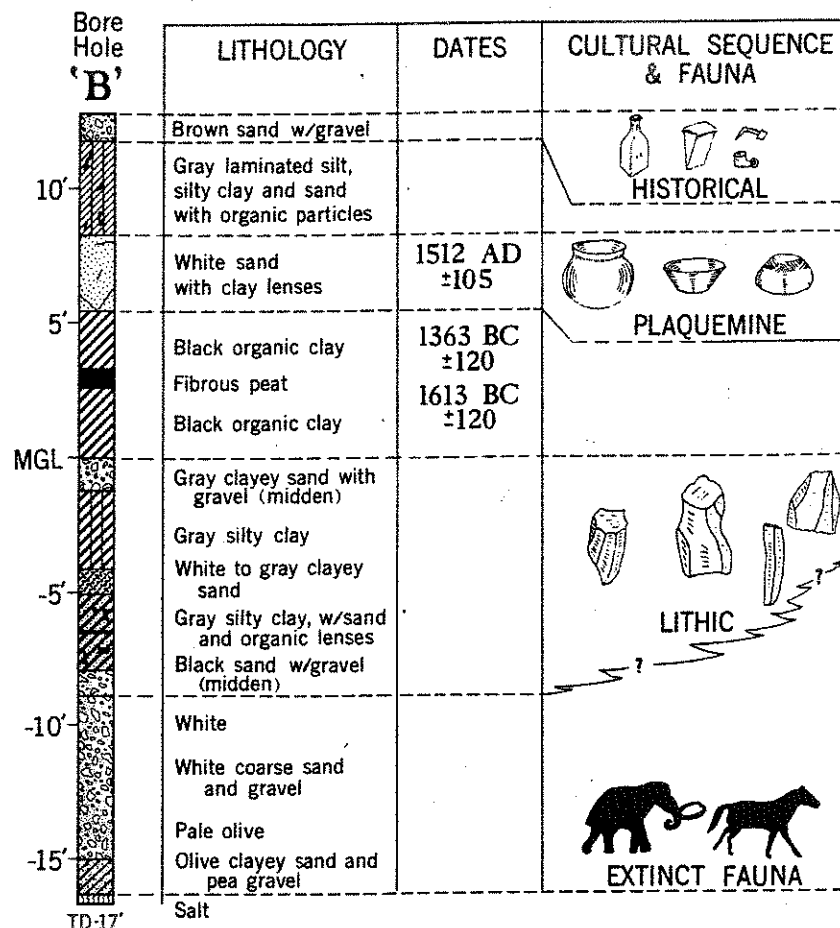


Figure 5: Details of Stratigraphy in Bore Hole "B" and Excavated Trench

Subject: Metro Mounds

Concepts:

- ▶ archaeological sites are nonrenewable resources
- ▶ preservation of sites is everyone's responsibility
- ▶ laws protect sites on state and federal land, and human burials on all land in Louisiana
- ▶ archaeologists rely on the public to help conserve sites

Materials:

- ▶ paper
- ▶ pencil

Background: There are several prehistoric mounds located within the city limits of this large metropolitan city. At the present time, several individuals own the land where the mounds are located. Homes have been built on the other lots so that those mounds cannot be purchased, excavated, or guaranteed preservation. Acquisition of the remaining portion of the site is now possible and has been proposed by a particular group such as the city council, a non-profit organization, or local university.

The site is in the midst of an affluent neighborhood. While archaeologists have been given permission to study one of the mounds, there is growing concern as to the fate of this significant prehistoric Native American site.

Activities: Most situations in our society today have multiple issues involved in the decision-making process. The following dilemma involves the class in role playing as student groups are set up to represent each of the four special interests listed.

The class will be divided into five cooperative learning groups. The groups will be assigned the roles of archaeologists, developers, the local and/or state politicians, landowners, and Native Americans.

The groups should be given about 30 minutes to discuss the issues of their group. Each group will have about five minutes to present their views as to the future of the metro mounds. After all groups have presented their views, the complexity of issues involved in site preservation should be discussed.

A public hearing will be held to determine the possibility of future acquisition and development of the lots still available on the market. All of the special interest groups listed below will attend. These groups will be allowed five minutes each to present their views.

Participants:

1. Archaeologists: Their position is one of the necessity of preserving this very significant site for future research. Excavation so far has yielded large amounts of data as well as the presence of human burials.
2. Developers: The original landowners knew of the existence of the mounds, but sold the property to a wealthy corporation. Approached by the state agency, they still refused to separate the mounds from the other lots developed.
3. Local & State politicians: On both levels, these politicians represent all constituents involved in the acquisition and development of the subdivision as well as all possible future use of the land.

4. Landowners: (a) those who actually own the lots where the mounds are located
 (b) those who own homes developed on lots where mounds are located
 (c) those home and landowners who bought in this area because of the restrictions and attractions of this type of subdivision
5. Native Americans: These individuals are concerned with their ancestry as well as human burials.

Extensions:

- ▶ Students can write up their version of what would happen depending upon which group gained possession of the mounds.
- ▶ The class could decide upon the legislation needed to preserve this site and possible measures which could prevent individual procurement of other mounds.

Remember!

Archaeological sites are nonrenewable resources. Site preservation is everyone's responsibility.

Subject: "Site" Surveys

Concepts:

- ▶ remains that people leave behind reflect their culture
- ▶ archaeologists use scientific reasoning, hypothesis testing, and conclusion drawing
- ▶ context (the interrelated conditions in which a site, artifact, or feature occurs) is critical in interpreting archaeological remains

Materials:

- ▶ drawing paper
- ▶ ruler or measuring tape
- ▶ pencil

Activities: Divide the class into cooperative learning groups. The teacher will assign a particular location on the school grounds where the group will study their "site" for about 15 minutes.

Each group will measure physical features and record the descriptions. The group will also describe the artifacts (material) from the particular "site" having drawn and recorded exact locations of the features and artifacts in relation to each other.

Each group will present their findings to the class without revealing the name of their "site."

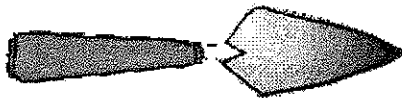
Members of the groups not presenting their data will guess the location and function of the "site" presented.

Suggested locations include:

- (a) band room
- (b) cafeteria
- (c) art room
- (d) counselor's office
- (e) gym
- (f) teachers' lounge

This activity was adopted from "Survey the School Grounds" in Clues from the Past edited by Pam Wheat and Brenda Whorton.

Environmental Science



Subject: Garbology

Concepts:

- ▶ archaeologists study behavior patterns
- ▶ archaeologists use the scientific method
- ▶ archaeologists study present as well as past cultures
- ▶ archaeological research contributes to environmental science research

Materials:

- ▶ paper
- ▶ pencil

Background: William L. Rathje is an archaeologist who studies garbage and landfills. His work began in 1973 when he and some of his undergraduate students founded the Garbage Project at the University of Arizona. Like all archaeologists, those who work with garbage use scientific procedures for digging and recording.

Activities: Have the students make predictions about the percentages of the following items found in landfills. The actual figures are also listed, but should not be given to the students until after class discussion of the predictions.

Categories	Examples	Percentages by volume
Glass	bottles, food containers, cosmetic jars	1%
Organic	wood, yard waste, food scraps	13%
Metal	iron, aluminum & steel cans	6%
Paper	packaging, newspapers, phone books, glossy magazines, mail-order catalogs	50%
Plastic	milk jugs, soda bottles, food packaging, garbage bags, polystyrene foam	10%
Miscellaneous	tires, disposable diapers, textiles, rubber, construction & demolition debris	20%

Next, have the students discuss where and how each thinks these figures were obtained.

Then, divide the class into small groups to decide upon the method(s) they would use to excavate a landfill. Each group will share their procedures with the class.

The procedures that Rathje uses in garbage archaeology include:

1. Auger operators unload samples onto plywood boards every 10 feet.
2. Scientists take temperature of sample refuse taken (90-130 degrees Fahrenheit, produced by the heat of biodegradation).
3. Microbiologists take samples to study factors influencing biodegradation.

4. Archaeologists shovel a minimum of 100 pounds of refuse into garbage bags for analysis of content, weight, and volume.

Extension:

►Have the students develop research questions which they would like to have studied by the Garbage Project. Actual research by the garbage archaeologists has revealed information about household economics and ethnic characteristics. For example, asparagus is an indicator of affluence; the research has shown that the richer households cut off more of the lower stalk.

Another study showed that Hispanic households wasted very little food. Mexican foods prepared by Hispanic households contain fewer ingredients, but are made with fresh foods. Therefore, if a frozen Mexican TV dinner becomes part of a landfill, it was probably not generated by an Hispanic household.

Note:

The article, "Once and Future Landfills," in the May 1991 issue of National Geographic contains pictures and additional information. The work of the Garbage Project has contributed invaluable environmental information and has influenced current movements dealing with issues such as recycling and biodegradation.

Subject: Modern Middens

Concepts:

- ▶ material remains reflect a culture
- ▶ archaeological research relates to the present, not just the past
- ▶ archaeological sites reveal behavioral patterns
- ▶ landfills are modern middens

Materials:

- ▶ May 1991 National Geographic
- ▶ paper
- ▶ pencil

Background:

Archaeologists study the material remains left behind by humans. Sometimes those remains are in the form of garbage. Most archaeologists study remains of the past such as the prehistoric shell middens along the Gulf coast of Louisiana. However, a few archaeologists study modern garbage and landfills (modern middens).

The Garbage Project at the University of Arizona has studied modern garbage and middens since 1973. Researchers have studied households in cities as well as landfills in numerous states.

The following information is the result of some of William Rathje's archaeological studies at Fresh Kills Landfill on Staten Island. By comparing this site with sites of the past, ties between prehistoric, historic, and present-day sites and people will be established.

Fresh Kills Landfill	Prehistoric Sites
Holds 2.4 billion cubic feet of refuse	25 times the volume of the Great Pyramid of Giza
Modern mound started in 1948	Pyramid of Giza dated to 2600 BC
Covers 3,000 acres (2.4 billion cubic feet of space) Receives 17,000 tons of refuse daily from New York City	Base of Pyramid of Giza covers 13 acres
Modern dating indicated by: (a) pop-up tabs (b) phone books (c) newspapers	Prehistoric dating indicated by: (a) arrowheads (b) pottery (c) metal artifacts
Behavioral patterns indicated by: (a) fast-food containers (b) disposable diapers (c) tires (d) textiles	Behavioral patterns indicated by: (a) jewelry (b) woven cloth (c) pollen/food (d) burial artifacts

The research of the Garbage Project has revealed much about our behavior and some of our social concerns. One of our major priorities indicated by fast-food containers and disposable diapers is convenience.

Several "landfill myths" exist and have been proven incorrect by the garbage archaeologists. Some of these myths are:

1. Myth: The volume of plastics is growing.

Truth: The percentage of refuse in early 1970's is the same as in 1986. The reason - to cut cost, competitors use less material: "light weighting."

Year	Product	Grams
1977	2-liter bottle	68
Present	2-liter bottle	51
1977	Gallon milk jug	98
Present	Gallon milk jug	60

2. Myth: A great amount of biodegradation occurs at landfills.
Truth: Trash analyses of The Garbage Project show startling realities of a lack of decomposition.

Examples:

Whole steaks	From 1973
Guacamole	From 1967
Leaves	From 1964
Lumber	From 1952

The research of the garbage archaeologists has made significant contributions in numerous areas. The immediate need for behavior modification is evident in our nation's recycling program. Increases in bioremediation research is another area of influence by the Garbage Project. Scientists from L.S.U. in Baton Rouge are leaders in the field of bioremediation.

The article, "Archaeological Chemistry," in February 21, 1983 issue of Chemical and Engineering News, includes an insert on two contributions made by archaeological research. Studies on ancient glass are aiding in the formulation of methods of nuclear waste disposal.

Shells from prehistoric middens have proven to be environmental indicators of changes in concentrations of elements. For example, a 15% increase in arsenic may be due to agricultural runoff from pesticides containing arsenic compounds. Also, elements from a military base (tellurium, hafnium, gold, holmium, niobium) have shown increases of 45 to 50%. The base has active artillery and bombing ranges, as well as producing products which contain some of these elements.

Activities:

Divide the class into cooperative learning groups. First, each group will address and discuss the following questions:

1. What do archaeologists do?
2. What are some of the artifacts they study?
3. How do they date a site that they study?
4. Is the data that they collect from prehistoric sites important to today's students?
5. Are we like prehistoric humans?
6. Does archaeological research relate to human behavior?

Extensions:

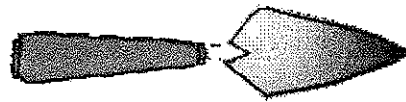
►After discussing the Garbage Project and some of the research, have students discuss any changes in their answers to the original questions.

►Have students take surveys asking other students the same questions. Compare results across grades and/or average results.

Remember!

Archaeological sites are nonrenewable resources which provide invaluable information about modern culture as well as prehistoric culture. Preservation of these sites is everyone's responsibility.

Biology



Subject: Patterns of Genetic Change

Concepts:

- ▶ archaeological contributions to the study of artificial selection
- ▶ prehistoric horticulture
- ▶ pollen analysis
- ▶ development of agriculture

Materials:

- ▶ pictures of wild and domesticated plants and animals

Background: Artificial selection is the process of choosing which characteristics are most important in a living thing, and manipulating the population by controlled breeding to make those characteristics more common. By studying archaeological evidence, we can trace the use of artificial selection by prehistoric people. As early humans evolved, the hunter-gatherer societies gradually changed because of cultivation of certain crops. The resulting crops were developed and changed through artificial selection.

Domestication occurs when animals or plants are adapted to live in a human environment and be of use to humans. Over time, humans have systematically tampered with the reproduction of certain species. All of the important food plants of the world are in the category of totally captive populations. Captive populations are those which have lost the ability to disperse their own seeds.

In studying North American Indian culture, it has been possible to trace the development of agriculture. The development of agriculture is thought to signal the beginnings of true civilization. By creating a surplus of food, some tribe members were released from food seeking duties and free to specialize in other areas.

This type of archaeological study involves both palynologists, who study fossil pollen to determine what plants were found in an area, and geneticists, who work to determine the difference between cultigens and wild vegetal types. Archaeologists also study the types of tools used for food preparation at sites. Scrapers and choppers may have been used for plants, but milling and grinding stones, as well as mortars and pestles, would surely indicate the use of grain.

Prehistoric people were initially organized into small groups of hunter-gatherers. Hunter-gatherer groups did not rely on agriculture, instead they foraged for food. By 5000 BC, people in the New World had domesticated corn, beans, and squash. Other New World domesticates included chili peppers, potato, amaranth, and avocado. Through the domestication of plants and animals, reliance on agriculture began to increase. During the period from 3400-2300 BC, more cultivation gave rise to food storage areas, which allowed the development of longer lasting groupings of people in villages and less nomadism.

Activities:

Distribute pictures of the wild and domesticated species of plants and animals. Students in cooperative learning groups should study the pictures or if available, actual examples of plants and compare them to determine the qualities that were selected in the breeding of each species (such as larger size or more flesh).

Class discussion involves each group's choices of those qualities artificially selected for the various species. Record the class lists on the board.

Extensions:

►Students choose a common fruit or vegetable and make a list of traits they would improve by artificial selection. Then, have the students draw their "improved" version. (Selected traits may be desired, but not necessarily feasible.) Would it matter if the parent plant was pure bred or hybrid (homozygous or heterozygous)?

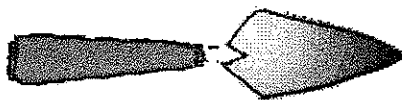
►Students could address the following questions:

1. How would you produce your ideal pet?
2. How is genetic engineering used to "short circuit" a process?

Reference:

Wills, Christopher. (August, 1992). "Has Human Evolution Ended?" *Discover*, p. 22.

Chemistry



Subject: pHeat Bog

- Concepts:**
- ▶ archaeological research contributes to the study of other sciences
 - ▶ necessity of preservation of archaeological sites
 - ▶ archaeological sites are nonrenewable resources
 - ▶ effect of pH levels on preservation

- Materials:**
- ▶ clear plastic liter bottles or aquariums
 - ▶ different brands of peat moss (at least 3)
 - ▶ sand
 - ▶ organic and inorganic objects
 - ▶ water

Background: Share the findings from the Windover site in central Florida. An article in the March 1987 National Geographic, "Mysteries of the Bog," has pictures from not only Windover, but other sites referenced in this lesson, as well.

Windover Archaeological Research Project was begun in 1984 after construction workers unearthed human skulls in a peat bog in central Florida. The pH at this site was neutral, but acidic levels in peat bogs throughout the world vary. At this 8,000 year old site, entire burials were preserved including cloth with five distinct types of weaving. A leaf with chlorophyll and a gourd add to the list of impressive artifacts. But, the most significant find was preserved brain tissue with DNA intact.

Other peat preservations include the Tollund man in Denmark discovered in 1950 and the Grauballe man in 1952. Peat is used in Europe as an energy source, and its medical applications are ancient.

Activities:

Divide the class into lab groups. Each lab group will prepare a peat bog using a liter bottle. The first layer consists of water and peat moss. Each bog requires alternating layers of peat moss and sand. Use two inches of peat and two inches of sand. Be gentle when adding the sand.

Organic objects (corn shucks, string, straw, bones, etc.) and inorganic objects (rocks) should be put next to the sides of the bottle at each level for observation purposes.

Set the bogs up at the beginning of the semester and keep them moist. The bogs must be kept wet enough to prevent contact with air. Keep records throughout the semester (include pH readings and preservation observations). Groups will report their findings and discuss the results.

At least three different brands of peat should be used by the class in order to ensure varying levels of pH.

Remember!

Preservation of archaeological sites is everyone's responsibility. These sites are nonrenewable resources.