Troop 1292 # 132A

MERIT BADGE SERIES

ARCHAEOLOGY

BOY SCOUTS OF AMERICA®

How to Use This Pamphlet

The secret to successfully earning a merit badge is for you to use both the pamphlet and the suggestions of your counselor.

Your counselor can be as important to you as a coach is to an athlete. Use all of the resources your counselor can make available to you. This may be the best chance you will have to learn about this particular subject. Make it count.

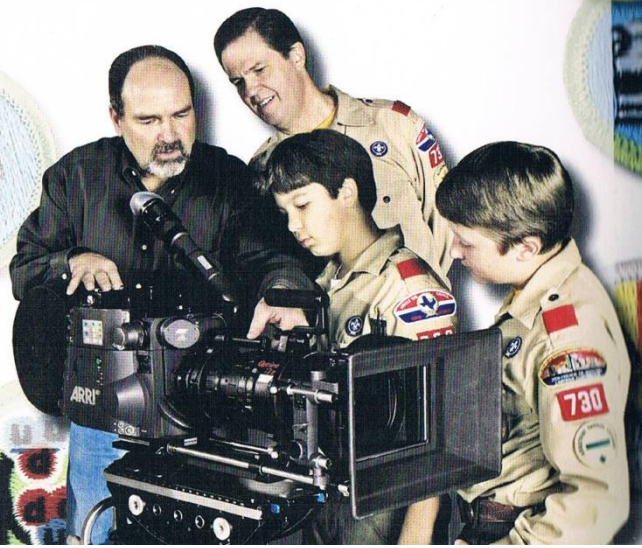
If you or your counselor feels that any information in this pamphlet is incorrect, please let us know. Please state your source of information.

Merit badge pamphlets are reprinted annually and requirements updated regularly. Your suggestions for improvement are welcome.

Send comments along with a brief statement about yourself to Youth Development, S209 • Boy Scouts of America • 1325 West Walnut Hill Lane • P.O. Box 152079 • Irving, TX 75015-2079.

Who Pays for This Pamphlet?

This merit badge pamphlet is one in a series of more than 100 covering all kinds of hobby and career subjects. It is made available for you to buy as a service of the national and local councils, Boy Scouts of America. The costs of the development, writing, and editing of the merit badge pamphlets are paid for by the Boy Scouts of America in order to bring you the best book at a reasonable price.



BOY SCOUTS OF AMERICA
MERIT BADGE SERIES

ARCHAEOLOGY

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Requirements

1. Tell what archaeology is and explain how it differs from anthropology, geology, paleontology, and history.

2. Describe each of the following steps of the archaeological process: site location, site excavation, artifact identification and examination, interpretation, preservation, and information sharing.

3. Describe at least two ways in which archaeologists determine the age of sites, structures, or artifacts. Explain what relative dating is.

4. Do TWO of the following:

   a. Learn about three archaeological sites located *outside* the United States.

   b. Learn about three archaeological sites located *within* the United States.

   c. Visit an archaeological site and learn about it.

   For EACH site you research for options a, b, or c, point it out on a map and explain how it was discovered. Describe some of the information about the past that has been found at each site. Explain how the information gained from the study of these sites answers questions that archaeologists are asking and how the information may be important to modern people. Compare the relative ages of the sites you research.

5. Choose ONE of the sites you picked for requirement 4 and give a short presentation about your findings to a Cub Scout pack, your Scout troop, your school class, or another group.

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6. Do the following:

   a. Explain why it is important to protect archaeological sites.

   b. Explain what people should do if they think they have found an artifact.

   c. Describe the ways in which you can be a protector of the past.

7. Do ONE of the following:

   a. Make a list of items you would include in a time capsule. Discuss with your merit badge counselor what archaeologists a thousand years from now might learn from the contents of your capsule about you and the culture in which you live.

   b. Make a list of the trash your family throws out during one week. Discuss with your counselor what archaeologists finding that trash a thousand years from now might learn from it about you and your family.

8. Do ONE of the following:

   a. Under the supervision of a qualified archaeologist, spend at least eight hours helping to excavate an archaeological site.

   b. Under the supervision of a qualified archaeologist, spend at least eight hours in an archaeological laboratory helping to prepare artifacts for analysis, storage, or display.

   c. If you are unable to work in the field or in a laboratory under the supervision of a qualified archaeologist, you may substitute a mock dig. To find out how to make a mock dig, talk with a professional archaeologist, trained avocational archaeologist, museum school instructor, junior high or high school science teacher, adviser from a local archaeology society, or other qualified instructor. Plan what you will bury in your artificial site to show use of your "site" during two time periods.

9. Under the supervision of a qualified archaeologist or instructor, do ONE of the following:
   a. Help prepare an archaeological exhibit for display in a museum, visitor center, school, or other public area.
   b. Use the methods of experimental archaeology to re-create an item or to practice a skill from the past. Write a brief report explaining the experiment and its results.

10. Do ONE of the following:
   a. Research American Indians who live or once lived in your area. Find out about traditional lifeways, dwellings, clothing styles, arts and crafts, and methods of food gathering, preparation, and storage. Describe what you would expect to find at an archaeological site for these people.
   b. Research settlers or soldiers who were in your area at least 100 years ago. Find out about the houses or forts, ways of life, clothing styles, arts and crafts, and dietary habits of the early settlers, farmers, ranchers, soldiers, or townspeople who once lived in the area where your community now stands. Describe what you would expect to find at an archaeological site for these people.

11. Identify three career opportunities in archaeology. Pick one and explain how to prepare for such a career. Discuss with your counselor what education and training are required, and tell why this profession might interest you.

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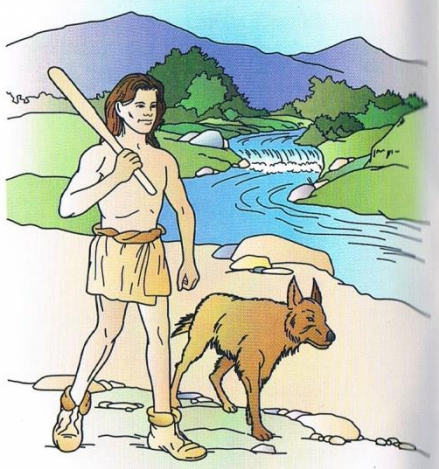
Introduction

Imagine a boy living where you live now, but hundreds or even thousands of years ago. He might have been about your age. Like you, he had friends and enjoyed playing games. He had a home and a family. He shared the beliefs of people in his community. He spoke a language that sounded just right to him, and his way of understanding the world made sense.

But where you live now was a much different place when the boy of the past lived there. It might have been a dense forest or an open plain. His house might have been made of animal hide stretched over poles, or bricks of mud and straw baked in the sun, or slabs of sweet-smelling cedar split from huge trees and decorated with carvings of eagles, ravens, and salmon.

The boy might have been taught how to hunt with spears or bow and arrows, or how to plant grains and store the harvest for winter. He might have learned to heal sicknesses by using medicines from plants. He may have sung the songs that kept alive the stories of his people from one generation to the next.

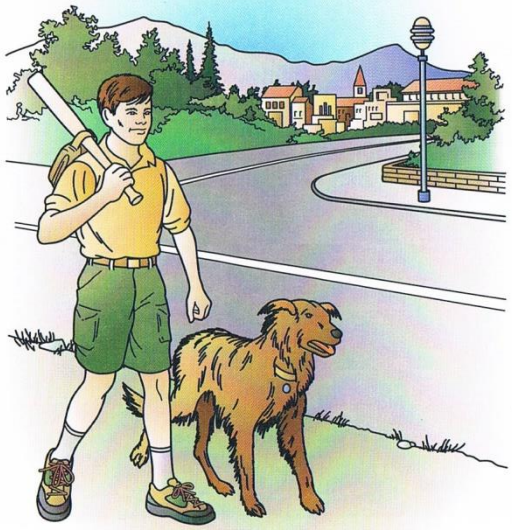


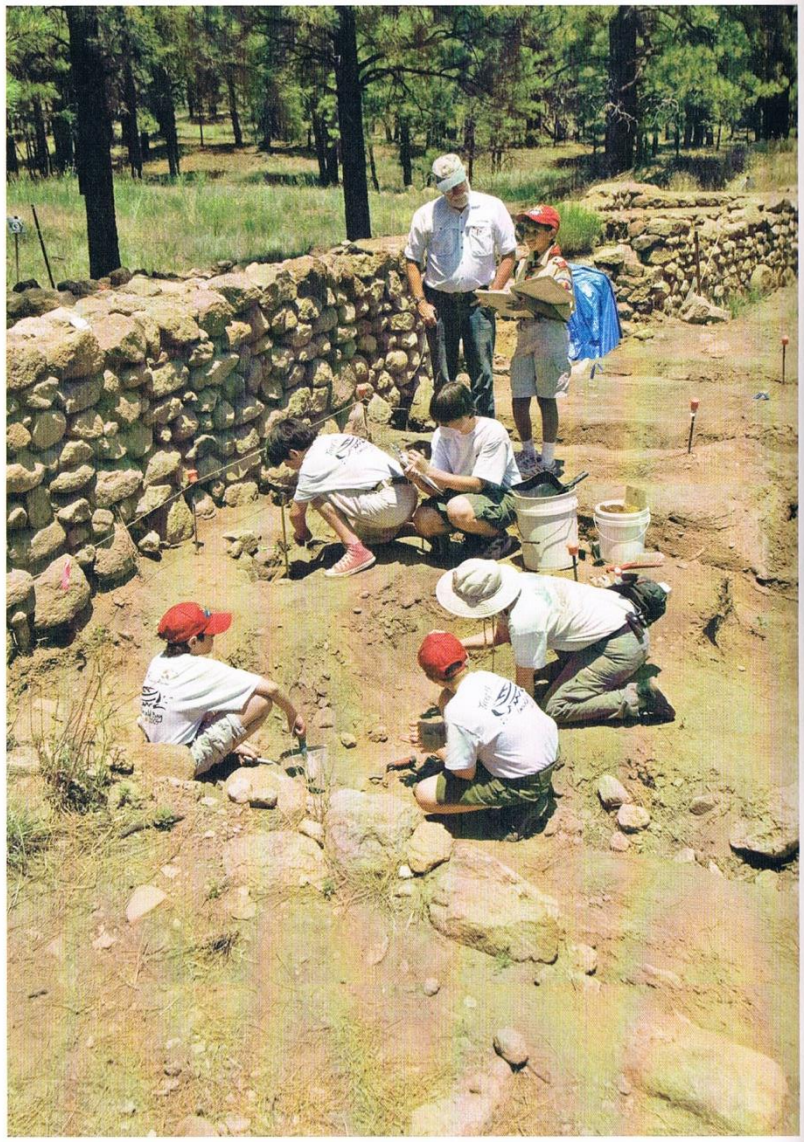
The boy had no wristwatch, but he kept track of time by looking at the sun and observing shadows on the ground. In his religion, he may have worshipped the spirits of the fish or buffalo that fed his people. He might have believed that gods lived on mountaintops, inside volcanoes, or in the spirits of certain animals.

Sometimes the sun shone warmly on the boy's face, and sometimes he took shelter from storms. His life was as real then as yours is today—full of bright colors, smells, tastes, and sounds. Like you, he probably thought the world in which he lived would never change much.

But that world has changed, and most of the people who lived long before us have been forgotten. Their homes have crumbled and disappeared. The bowls from which they ate and the tools they used have become scattered. Their languages and beliefs are largely lost. Their stories may now be but a whisper in the wind.

Even so, you can learn about that boy from long ago and the life he led. You can discover some of the ways that his life was like yours, and how it was different. To make these discoveries, you need a key to begin unlocking the secrets of the past. That key is archaeology.





Who Are Archaeologists?

Archaeologists are detectives who study how people lived in the past. They figure out what happened, when, how, and why. Using the clues that people left behind, they try to understand how and why human culture has changed through time.

Archaeologists do their work, in part, because they want to satisfy their curiosity. Like all of us, archaeologists love to find out about other people, other places, and other times. We all benefit from their studies because archaeologists like to share their discoveries with the public. They provide answers to our questions about the past.

Knowing about those who lived before us is important because the people of the past helped to make us who we are today. The beginnings of our knowledge can be found in the things people knew and did thousands of years ago. Our languages and our ways of doing things—that is, our cultures—have been passed down through the ages.

We are only the most recent generations to inhabit Earth. Human culture has been enriched by all of the generations of people who lived, worked, and enjoyed life before us. As we learn about these ancestors of ours, we also learn about ourselves and how we got to be the way we are. By studying the past, we can learn much about the present.

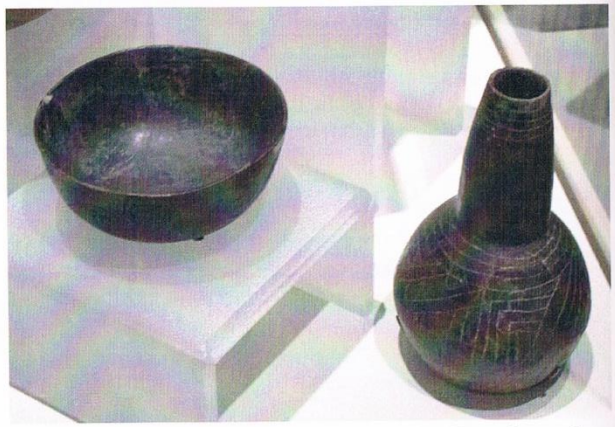
A *culture* is the way of life shared by a group of people and passed down from one generation to the next. The people of a given culture have the same language and similar customs, beliefs, ceremonies, habits, food preferences, and so on.

What Archaeologists Study

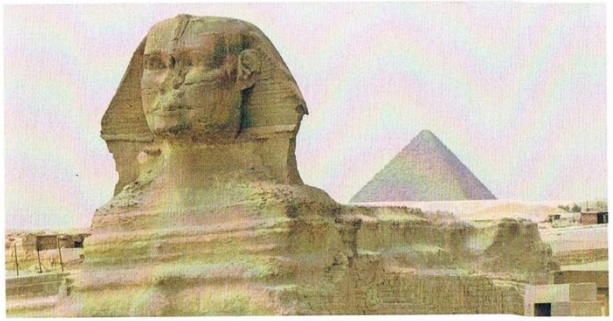
The word *archaeology* comes from the Greek word *archaios,* meaning "ancient," and the Latin *logia,* meaning "to talk or write about"—that is, to study. Archaeologists study the material remains of past cultures—the things people left behind—to learn how people lived and how cultures have changed through time.

Archaeology is a branch of a larger science called *anthropology*—the study of human beings. While anthropologists are concerned with all aspects of human makeup and behavior, archaeologists focus on the stories of the people of the past—people who are no longer around to speak for themselves.

Much of archaeology is the study of people who did not leave a written history of their experience, or who left records in languages that we no longer understand. Even so, these people have left clues about themselves. Evidence of their existence may take the form of *artifacts* such as stone or metal tools, or pieces of broken pottery. Or we might find signs of human activity, such as rocks arranged in circles, or earth blackened by campfires from long ago, or trenches that show where walls once stood.



Bits and pieces of the human past have survived into the modern age. These prehistoric Caddoan artifacts provide information about vanished peoples and cultures.



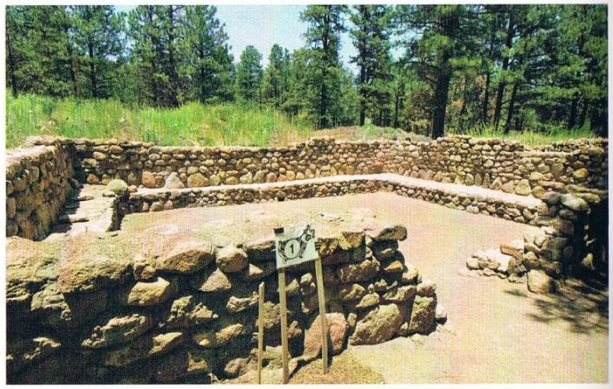
The Great Sphinx at Giza in Egypt, with a pyramid in the background

The Great Hall at Grand Portage National Monument in Minnesota. The original structure was built in 1784 and was later reconstructed using information learned through archaeology.

Many archaeologists specialize in studying groups of people who lived thousands of years ago. Some study the civilizations that built the great pyramids in Egypt and the temples in Greece, South America, and Asia. Some archaeologists are interested in ancient hunters whose spear points pierced the sides of mammoths in the American Southwest. Others devote their careers to studying the remains of early humans found in Africa.

Archaeologists also unravel puzzles about people who lived much closer to our own time. We get clues from items found in sunken ships, forgotten farmsteads, buried villages, and traditional American Indian gathering places.

Archaeologists study both historic and prehistoric cultures. What's the difference between history and prehistory? Prehistory deals with the time before people learned to write, beginning when humankind appeared on this planet and ending when people started to make written records of their activities.

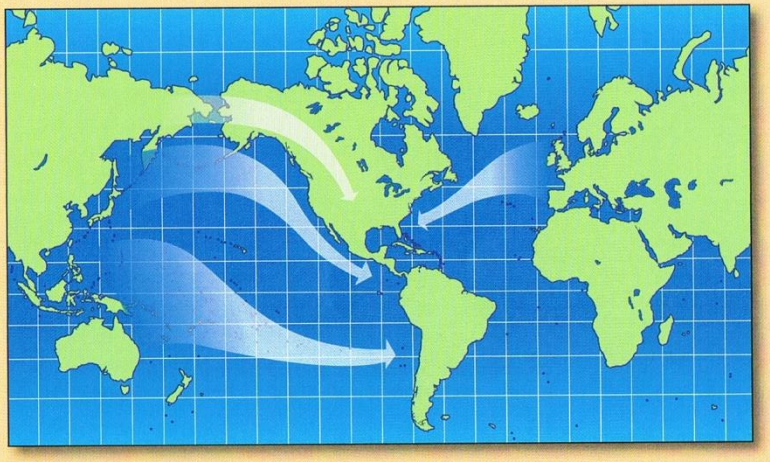


The discovery of artifacts and settlements abandoned relatively recently—in historic times—helps tell us what happened to the people who made or built them.

Who Were the First Americans?

Recent excavations in South Carolina may provide evidence that people lived in the Americas earlier than scientists once believed. Archaeologists long thought the first human beings in the Americas were the Clovis people who crossed a land bridge over the Bering Strait into Alaska. Scientists believe these hunters of mammoths lived at the end of the last Ice Age, about 12,000 or 13,000 years ago. At South Carolina's Topper site, however, archaeologists have found stone tools, including small, simple chisels, that are older than the tools made and used by the Clovis people. The finds and their early dates suggest humans may have arrived in North America earlier than previously believed and may have come from many directions.

Named for the amateur archaeologist who discovered it, Topper is the site of a prehistoric quarry that was a source of chert, a flintlike rock used to make tools and arrowheads. Work there is directed by Al Goodyear, an archaeologist with the University of South Carolina. Excavation began in the early 1980s and still continues. Much of the work is done by volunteers, including teenagers, who come to the site each spring. Goodyear says it is possible evidence will be found showing that people were in the area of the Topper site long before the last Ice Age. "We may be in for some surprises," he says.



Instead of walking from Asia into Alaska, suggests one theory, prehistoric immigrants might have sailed across oceans to reach the New World. The first settlers on the eastern American coast might have been seafarers from Europe, members of the ancient Solutrean culture of Spain and France. During the height of the Ice Age, these sailors could have followed an ice shelf that stretched from Ireland to Nova Scotia. As they crossed the Atlantic Ocean, they would have hauled their boats up onto the ice occasionally to rest, hunt and fish, or take shelter from storms.

Artifacts and Relationships

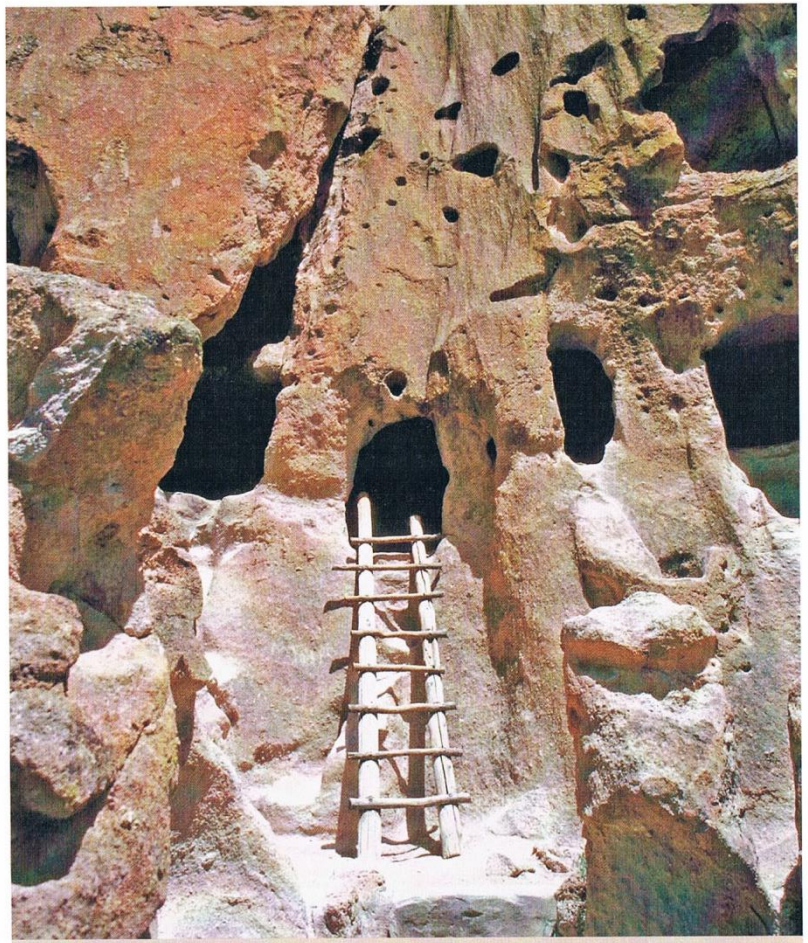
Archaeological artifacts are any items that have been made, used, or changed by people. Examples include stone tools, arrowheads, pottery, utensils, coins, bottles, and jewelry.

Artifacts typically are portable and easy to carry around. The items were perhaps lost by their original owners. Some might have been broken and thrown away. Many were hidden for safekeeping or placed alongside the bodies of their owners in burial sites. To archaeologists, artifacts—and the *relationships* between artifacts and where the items are found—are windows into the lives of the people who once lived at that place.

This idea of relationships between objects is important. Think of all the little parts that go together to make a wristwatch. If you take the individual parts out of a watch and study each one separately, will that tell you how the watch functions? No. You must look at all of the parts in place inside the watch to see how they work together. The same is true of archaeological sites. Like a watch, an archaeological site is a complicated package that must be opened carefully and studied as a whole if we are to make sense of it.

A researcher who looks at only a few stone tools and a few kernels of corn might find that, by themselves, the artifacts reveal little. However, if the tools are found in a room with a hearth or fire pit, a grinding stone, and other stone tools and artifacts, the researcher might conclude that the room was a prehistoric living area. A few kernels of corn found in a space that did not have a hearth or any other artifacts would suggest that the room was probably a storeroom.

Fossils are the stonelike remains of living things that developed as minerals from the soil slowly replaced the chemicals in the dead animals or plants.



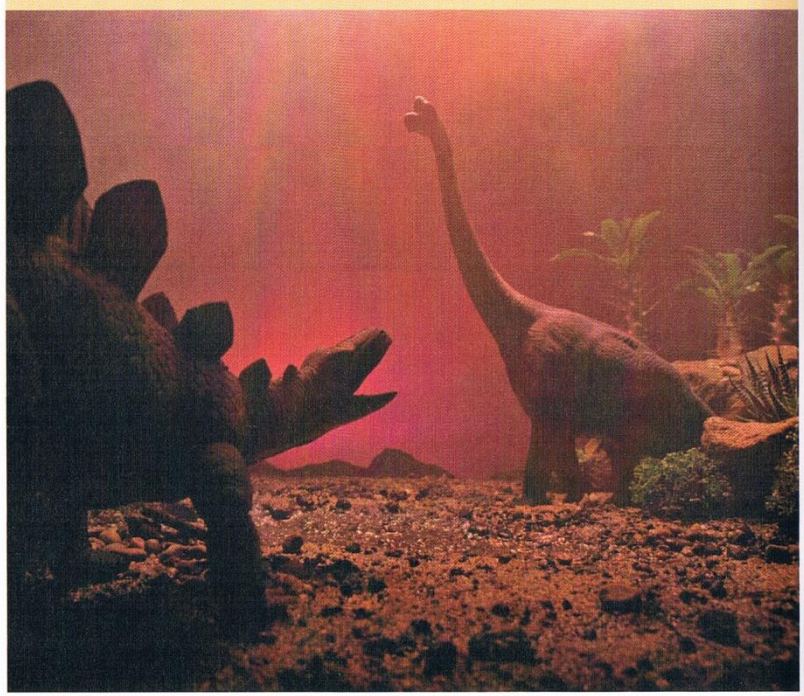
The study of artifacts and the sites where they are found can reveal much about the everyday activities of the past. We can learn where people lived, how they got their food, and what they wore. Archaeological findings may also explain some of the important events in the lives of people long dead—a war or a ceremony, for instance, or a major fire or flood. Such discoveries can help us to understand what shaped entire civilizations.

Related Sciences

Several related sciences help to shine a light into the past. *Geologists* study Earth itself and how it changes over time. They examine the clues revealed by rocks, soil, and the shape of the land. Geologists are interested in the forces that form the physical features of the land and alter the land's appearance.

Paleontologists examine fossils of dinosaurs and ancient vegetation. They dig for fossils to learn about animal and plant life of long ago, and they share their findings by writing reports and creating museum exhibits.

Scientists caution you not to be misled by the movies or television shows you may have seen that show prehistoric humans hurling spears at dinosaurs. They believe that this could never have happened because there were no people on Earth when dinosaurs lived.

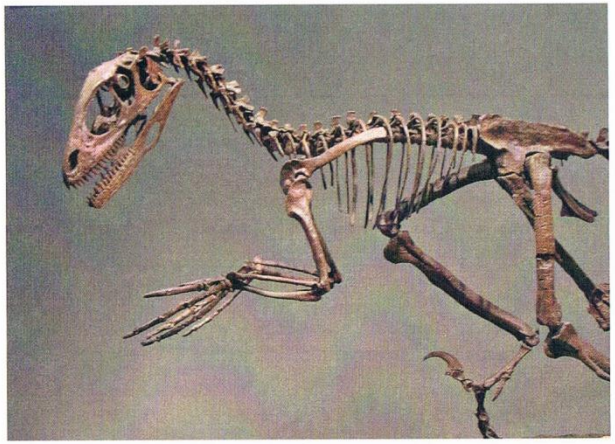


To help you keep these "ologies" straight, here's a simple list:

- Anthropology—the study of humans in the widest sense
- Archaeology—the study of human activities and cultures of the past
- Geology—the study of rocks, soil, and terrain
- Paleontology—the study of fossils of ancient animals and plants

The study of history also is often useful in archaeology. One way to think of history is that it is the past revealed through written records. Journals, newspapers, shopping lists, legal papers, books, and letters are only a few of the sources of information historians draw upon to re-create moments of the past. Archaeologists may use written records to locate sites, to find out how artifacts were made and used, and to expand their understanding of earlier times. Even when they are investigating prehistoric sites, they may research the historic record for clues to the more distant past.

Archaeologists may draw upon the knowledge and methods of other specialties and sciences, too. Among these are architecture, astronomy, art, biology, botany, chemistry, geography, and physics.



Paleontologists study dinosaurs, such as this *Deinonychus,* and other life forms from the distant past. This skeleton can be seen at the Field Museum in Chicago.

Geologists study Earth itself.

Found this among some old clippings had saved thought you or one of your family would like to have it- best regards, Mrs. J.L. Mims 150-

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MONDAY,

Globe Trotter Finds Much to Do Here, His Early Life Jammed With Action

Helps . $15,000,000 of Jobs During Dozen Years in City

Andes to Taj Mahal Journeys Round Out Engineer's Work

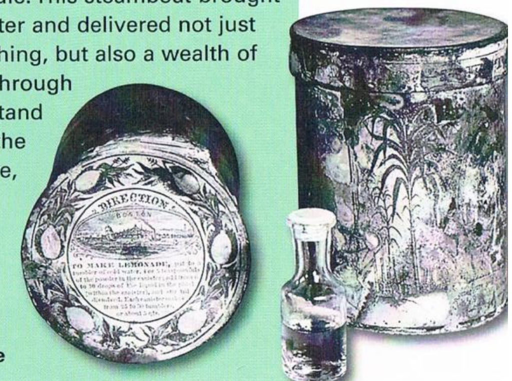
Historians study the relatively recent past as it is revealed through written records.

The Steamboat *Bertrand*: Lost and Found

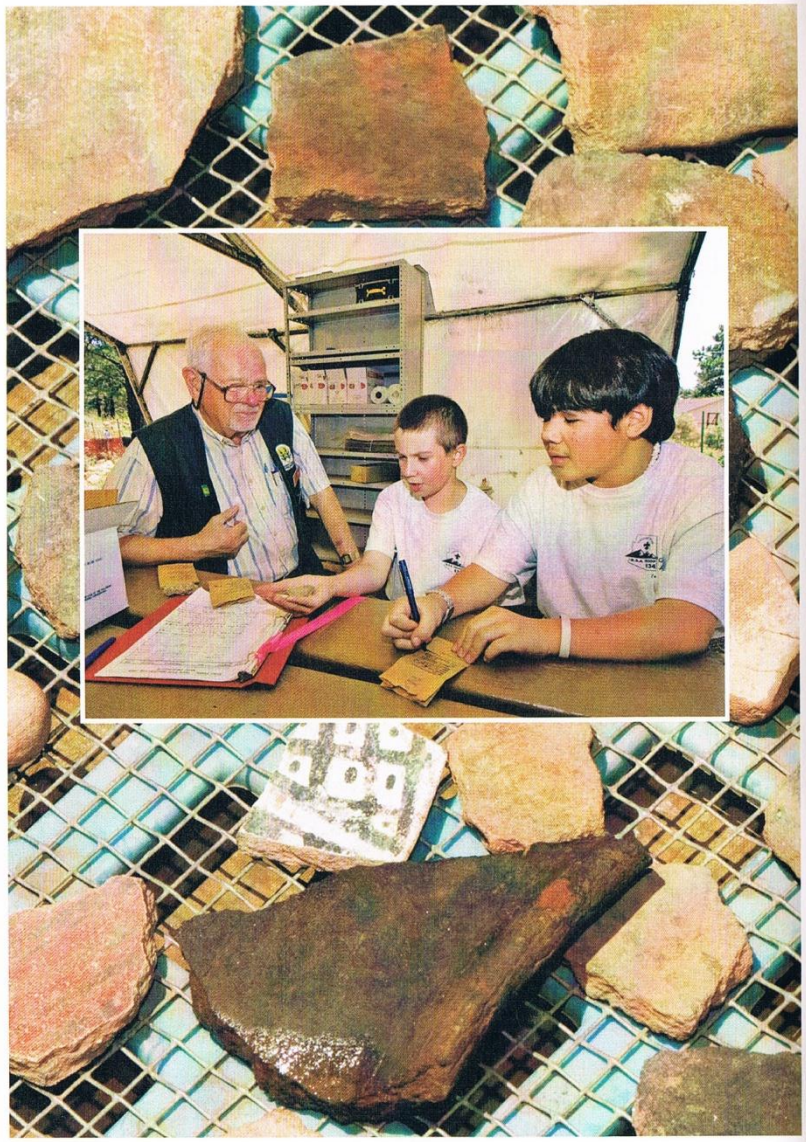
In 1865, a big steamboat called the *Bertrand* was making its way up the Missouri River, carrying a full cargo of supplies destined for miners and settlers upriver in Montana. Just north of Omaha, Nebraska, at a turn in the river called DeSoto Bend, the *Bertrand* hit a submerged log and sank into the waters of the Missouri. In the decades that followed, people forgot about the steamboat, or they remembered it only in stories passed down through the generations.

In 1968, treasure hunters called *salvors* studied clues from old documents and discovered where the *Bertrand* lay, well-protected. It took archaeologists from the National Park Service months to uncover the remains of the steamboat. Inside the hull, they found clothing, tools, and thousands of other items. At the DeSoto National Wildlife Refuge at Missouri Valley, Iowa, you can see artifacts recovered from the *Bertrand*. There, archaeologists use laboratories to preserve and study the contents of the steamboat. This process will continue for many years.

While the *Bertrand* never reached its destination, it has served as a time capsule. This steamboat brought cargo to people a century later and delivered not just old-fashioned tools and clothing, but also a wealth of knowledge about the past. Through archaeology, we can understand much about how people of the time worked, what they wore, what they ate, and what goods they used.



Artifacts recovered from the *Bertrand* are displayed at the DeSoto National Wildlife Refuge at Missouri Valley, Iowa.



Archaeology and Responsibility

Perhaps you have been at a ceremony where a time capsule from a hundred years ago was opened. There might have been coins inside, and newspapers, photographs, and other items that people a century ago thought were important. You probably thought the contents of the capsule looked odd and antiquated, yet seeing the items helped you learn about the people who had so carefully placed them in the capsule.

An archaeological site is like a time capsule. Both contain messages from the past.

Digging up an archaeological site carries with it a duty to carefully document everything that is disturbed. The excavation process is destructive, and the paper record is often all that remains. Without careful records, precious and fragile pieces of the past may be lost forever.

After the ceremony, what happened to those objects? If one person took them home and kept them in a box, no one else would be able to view them. Or, if everybody at the ceremony took away one item, it soon would be hard to remember everything that had once been together in the capsule. Some of the items would probably be lost or given away or sold. As the time capsule's contents were scattered, its meaning would be lost.

But if the artifacts found in the capsule were properly studied, labeled, and displayed in a public place, everyone could enjoy them. People interested in the past could use the items to learn what a place or a culture was like long ago. Future generations could have the same pleasure in seeing the items as you did when the time capsule was first opened. The message from the people of the past would be kept alive, passed down from generation to generation.

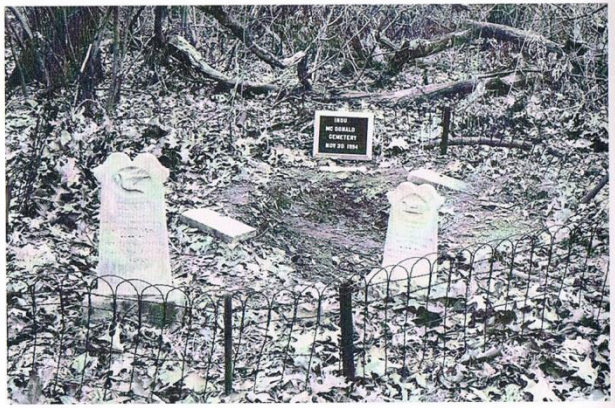
Archaeological sites, like time capsules, must be opened in the right way so that the information they contain will not be lost. That is a responsibility for archaeologists, who have studied excavation procedures and preservation techniques.

An archaeological site, such as a shipwreck or the remains of a prehistoric village, is like a time capsule. Each may contain items that, when studied together, will reveal much information about who was there and what their lives were like.

Being an archaeologist requires training to learn the correct methods to find, excavate, document, and interpret sites and the artifacts they contain. We rely on archaeologists to use the right procedures so that they can gain as much information as possible when they excavate a site or lead others in uncovering artifacts. We rely on them to interpret messages from the past. We also rely on them to share with all of us the information that they discover.

Pothunting and Vandalism

An archaeologist's careful work can be ruined by a looter or vandal who steals artifacts or damages a site. These thieves, called *pothunters,* only want to find items from the past and take them. Pothunters don't care about the knowledge that might be gained from studying how the artifacts are related to other materials at the site. Pothunters may keep artifacts for themselves or sell them for money. In either case, the artifacts disappear from public view, and the information that they might have provided is lost forever.



Looters, or pothunters, do serious and permanent damage when they disturb archaeological sites and steal artifacts. This historic cemetery at the Indiana Dunes National Lakeshore was vandalized by pothunters.

Protecting the Past

There are many ways you can help to preserve archaeological sites and artifacts and the knowledge that comes from them.

- *Do not dig for artifacts* unless you are working under the direction of a trained archaeologist who has an approved excavation permit.
- If you see others digging for artifacts, report what you have witnessed to a local law enforcement agency or the agency that manages the land, or tell the site manager, a park ranger, or other responsible official.
- If you think you have discovered artifacts, leave them alone. If you are in a national or state park or forest, report the find to a ranger. Otherwise, contact your state historic preservation officer. (See the resources section in this pamphlet.) Experts can evaluate the artifacts where they were found, then determine whether further study should be done.
- Volunteer to help historical and archaeological societies monitor sites against vandalism and repair any damage that has been done.
- Learn all you can about the archaeology of your area so that you can better inform others about the importance of protecting sites and artifacts.

Pothunting is stealing. Such looting robs present and future generations of knowledge that can never be replaced. Pothunting is against the law on state, federal, and American Indian lands, and in many privately owned areas.

Artifacts and the Internet: The Illegal Market

The Internet has made it easy to buy and sell artifacts. This situation encourages pothunters to destroy archaeological sites all over the world in search of artifacts to sell. The problem is growing at an alarming rate despite laws that ban the looting of sites and the transport and sale of antiquities that have been illegally obtained.

You can do your part to discourage the illegal trade in artifacts on the Internet and elsewhere. Never buy artifacts that were once underground or underwater. The chances are good that the object was dug up illegally, is a fake, or was obtained by destroying a site.

Protect yourself and protect the past: If you or your parents buy "old-timey" artwork, collectibles, or crafts such as pottery, jewelry, or carvings, buy pieces by modern American Indians or other artists, or buy reproductions (clearly labeled as such) of ancient artifacts. Steer clear of purchasing bottles, coins, belt buckles, and buttons at antique shops, because many of these items may have come from looted sites.

Ozette: A Legend Comes True

Among the Makah Indians of northwestern Washington, the story is told of a great disaster that destroyed the tribe's ancestral home. The legend says that, long ago, a mountain of mud fell upon their village at the edge of the Pacific Ocean.

A new chapter was added to that story in 1970, when raging winter storms sent high waves to scour the beach at a place called Ozette. The waves washed away part of a mud bank and exposed many artifacts, among them a canoe paddle, fishhooks of wood and bone, the shaft of a harpoon, bits of inlaid boxes, and a woven hat.

Excavation of the site showed that the Makah legend is true: About 500 years ago, a mountainside of wet clay plunged down the steep, tree-covered slope above the coastal village. The mudslide buried the sturdy cedarwood houses without destroying them.

The wet clay sealed the houses so tightly that everything inside was preserved except flesh, feathers, and skins. Looms, wood carvings, wooden bowls, cone-shaped rain hats made of spruce roots, baskets, and even cloth—materials that are rarely recovered from any archaeological site—were held safe through the centuries.

The land is part of the Ozette Indian Reservation, home of the Makah tribe. Archaeologists and members of the tribe worked together to investigate the site. People from the reservation helped with the excavation and with running a preservation laboratory at nearby Neah Bay.

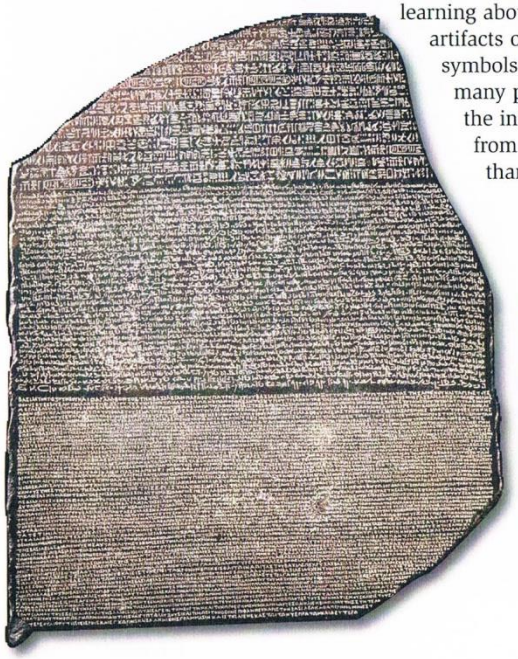
Special techniques were needed to uncover and preserve the waterlogged wooden remains at Ozette. The excavators built a complicated pumping system that sprayed jets of water of different strengths—from blasts powerful enough to remove dense mud from house planks, to a gentle trickle used for washing the muck from combs and wooden spindles.

By agreement, all excavated objects have remained on the reservation in a museum built and operated by the Makah tribe. "We look in a special way at what has come from the mud at Ozette," say the Makah, "for this is our heritage."

The Development of Archaeology

Archaeology as it is practiced today is a fairly new science. Several hundred years ago, people who dug into ancient sites often did so only to find treasures that could be collected or sold. While many of the collectors called themselves antiquarians, by today's standards they were little more than pothunters.

Thieves did enormous damage. In Egypt, for example, thieves broke into most of the pyramids and tombs and took what they found, without leaving any record of what had been there. They were not interested in learning about those who had left the artifacts or covered the walls with symbols. Over the years, fortunately, many people came to realize that the information that could be gained from a site was often more valuable than the artifacts themselves.



Found in 1799, the Rosetta Stone was the key to deciphering Egyptian hieroglyphs. The stone had three inscriptions on it—the same text written in three scripts, including Greek and ancient Egyptian hieroglyphic writing. A French scholar used the Greek text, which he could read, as a guide to translate the mysterious hieroglyphs. It was the breakthrough scientists needed to understand the pictorial writing system of ancient Egypt.

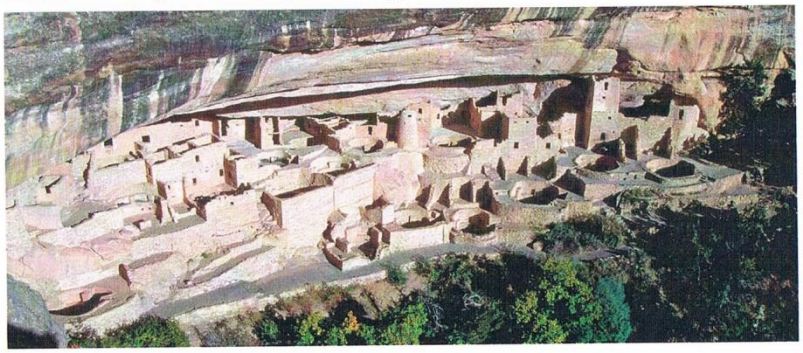
American Archaeology

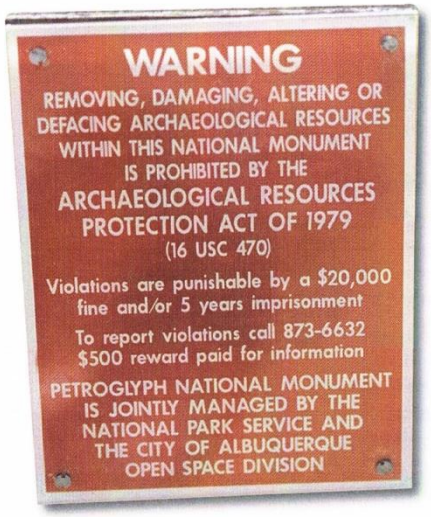
In the United States, Congress has passed laws that recognize the importance of our past and the need to protect archaeological sites. The first major piece of federal legislation for preservation was an act of Congress in 1889 that authorized the president to protect Pueblo Indian ruins at Casa Grande, Arizona. Among the important laws since that time are the following.

Antiquities Act of 1906. This law protected cultural materials found on public lands and was intended to stop the destruction of prehistoric sites and artifacts in the West. It also set up a way for responsible archaeologists to excavate important sites.

Historic Sites Act of 1935. This act authorized several programs to be carried out under the National Park Service. Under this law, sites that have exceptional value for commemorating or illustrating U.S. history can be protected as national historic landmarks.

National Historic Preservation Act of 1966. At the time of this law's passage, more archaeological sites and historic buildings were being destroyed by rapid economic development than by pothunting or vandalism. This landmark piece of legislation extends the protection of the federal government to historic resources at the state and local levels. The act provides for federal grants to state and territorial historic-preservation agencies, and its passage led to the establishment of the National Register of Historic Places. The National Register includes not only national historic landmarks, but also sites, objects, buildings, and districts (collections of structures) that are significant in American history, architecture, archaeology, and culture.





The Archaeological Resources Protection Act imposes penalties on those who damage archaeological sites.

Archaeological Resources Protection Act of 1979. This law gives more protection to archaeological resources on public and American Indian lands and encourages the sharing of information gathered from these sites. It also toughens penalties for the unauthorized excavation of or damage to archaeological sites and controls the sale of artifacts. Since 1979, all construction on federal lands or that uses federal funds requires an archaeological survey to find out if archaeological sites will be damaged by the construction, and how the information from the sites can be recorded before that happens. All states have similar laws that protect archaeological resources on state lands.

Native American Graves Protection and Repatriation Act of 1990. Archaeologists exploring the past sometimes come upon the bones and other remains of human beings. Native Americans have raised concerns that the burial grounds of their tribes should not be disturbed, any more than the cemeteries of other groups. Many American Indians believe that the remains of their ancestors should not be stored or displayed in museums, but should be reburied according to the traditions and religious beliefs of their tribes.

The Act protects American Indian grave sites on lands managed by the federal government. The law requires thousands of federally funded museums and agencies to inventory their holdings of human remains, grave goods, sacred objects, and other items important to American Indian cultures. The museums and agencies must tell the tribes about the sacred and cultural items in their collections and return the objects to the tribes that claim them.

Kennewick Man—A Survivor

On the Columbia River in southeastern Washington, two young boat-racing spectators stumbled across one of the oldest skeletons ever discovered in North America. The skeleton was named Kennewick Man for the town where the bones were found in July 1996. Scientists using radiocarbon dating estimate the skeleton is about 9,300 years old.

Kennewick Man was a survivor. His bones show he had suffered a broken elbow, a crushed chest, and a skull fracture as though he were clubbed in the head. He lived through all these injuries. He also carried a spear point permanently stuck in his right hip. The stabbing wound, like his other injuries, had healed. But the Stone Age weapon lodged in his hip probably made walking difficult for Kennewick Man, who was about 45 or 50 years old when he died.

Soon after his skeleton was found, several American Indian tribes in the Pacific Northwest claimed it under the Native American Graves Protection and Repatriation Act. The tribes consider Kennewick Man an honored ancestor and wish to rebury his bones secretly so the skeleton could never again be unearthed. Tribal beliefs teach that the remains of ancestors should not be disturbed, but if bones are disturbed they should quickly be set at peace.

Eight well-known archaeologists and anthropologists sued for the right to study the bones. The ancient remains could help solve the mystery of who the first Americans were, where they came from, and how and when they got here. Only a few skeletons that scientists believe are more than 8,000 years old have ever been found in North America, and the Kennewick skeleton is in excellent condition and nearly complete.

The legal battle for this ancient American lasted for eight years, until a federal court ruled in July 2004 in favor of the scientists. The court found the Indian tribes had not shown they were Kennewick Man's living descendants. Tests suggest the man is not closely related to any Native Americans, but is closer to the Ainu, the indigenous (native) people of Japan.

At the time of this writing, the skeleton remained locked in a museum at the University of Washington as people continued to argue over how the bones should be studied. You can follow the controversy about Kennewick Man on the Internet at http://www.kennewick-man.com. (Get your parent's permission first.)

Appreciating the Past

As you can see, archaeology has become an important science for exploring our past and preserving our heritage. Visitor centers have been built at many archaeological sites where you can view artifacts and learn about the people who made and used them. Museums, schools, and public buildings may also have exhibits that share with everyone the knowledge gained by studying the past.

Programs at many colleges and universities invite young people to learn the methods of archaeology, then to help excavate sites and prepare artifacts for display. Archaeology clubs and professional associations promote the appreciation of the past and help protect cultural resources.

Libraries are a rich source of information about archaeology and ancient cultures. Librarians can help you find books about the science of archaeology and about the peoples and periods of the past that interest you.

The Internet also offers many opportunities for exploring the world of archaeology via computer. Many archaeological sites and visitor centers have home pages, as do university programs, federal agencies, and archaeological organizations. For some suggested books and Internet sites, see the resources section of this pamphlet.

Before you go online, be sure you have your parent's permission.

This polished black ceramic vessel decorated with engraved lines filled with red pigment was recovered from a prehistoric Caddoan village in Texas.

The Iceman: Visitor From the Past

In September 1991, hikers in the Alps along the border of Italy and Austria found a body frozen in a glacier at an altitude of 10,500 feet. The corpse was so well-preserved that the hikers thought it was a fellow mountaineer who had died on the slopes recently.

Medical examiners soon realized, however, that the Iceman, as he has come to be known, was not a recent accident victim. The mummified body had been locked in the glacier for some 5,300 years, making it the most ancient human body ever found virtually intact. With him, he brought his clothes, tools, and weapons.

Scientists examining the body and the artifacts found with it discovered that the man was well-equipped for alpine travel. He carried a backpack, a knife with a flint blade, an unfinished bow, a leather quiver with more than a dozen arrows, a copper ax, and several small tools of flint and bone. He stood about 5 feet 3 inches tall. He was perhaps 40 years old, with dark hair and a beard. He wore leather shoes lined with grass for warmth. The man's leather jacket was finely stitched with threads of animal sinew or plant fiber.

What was the Iceman doing so high in the mountains? Was he a herdsman tending sheep or cattle? Was he hunting deer, or searching for flint or copper? Was he on the run from enemies? How did he die? Did a sudden mountain storm, a blizzard, or a dense fog catch him by surprise? Did he freeze to death? Did he starve? Was he hurt in a fall, or injured in a fight? To answer these and other questions, investigators are using the techniques of many sciences—chemistry, biology, medicine, anatomy, radiology, meteorology, archaeology, history, and such combinations as paleoethnobotany (the study of plant use in prehistoric times). Pollen found on the Iceman's clothing has been identified.

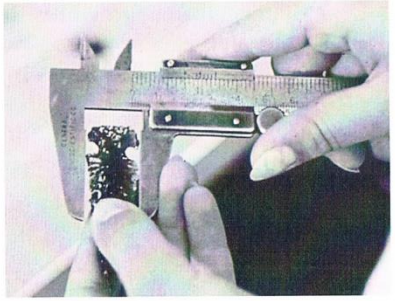
Three-dimensional computer images, or CAT scans, have been made of the skeleton and internal organs. Tests for carbon 14 have been done on the grass lining of one shoe and on the body itself. Carbon 14 tests are a way to date artifacts. See the section on radiocarbon dating later in this pamphlet. The Iceman's body will be left as intact as possible for future investigators to examine with even more sophisticated techniques.

How Archaeology Happens

Archaeologists follow a careful step-by-step process designed to protect resources and obtain the most information possible. The process includes these steps: site location, site excavation, artifact identification and examination, interpretation, preservation, and information sharing.

Site Location

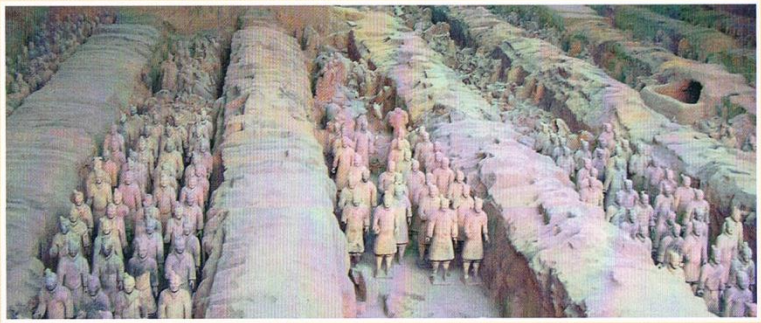
Archaeologists find sites in many ways. They sometimes study old letters, maps, journals, and other documents for clues to the locations of historic settlements or American Indian camps. They may use aerial photographs and pictures taken from satellites to home in on the places they are trying to find.



Measuring an obsidian artifact from the Nightfire Island site in Oregon

Sites are sometimes found during surveys that may be required before new roads, dams, apartment houses, or other structures can be built. Archaeologists walk the entire area, looking for anything made by humans that is more than 50 years old. They may dig test pits or trenches in the pathway of the proposed construction. If artifacts appear, the site may be excavated before construction machinery disturbs the area.

Luck sometimes plays a role in the discovery of archaeological sites. Scouts on a hike might notice an arrowhead on the ground, or a piece of pottery. *They don't move the artifact,* but report the location to archaeologists who can examine the item where it lies and determine whether it signals the presence of a site worth studying.



An Awesome Find

In 1974 in China, a farmer digging a well broke through the roof of the tomb of an emperor who had lived more than 2,000 years ago. Archaeologists who excavated the tomb found an army of terra-cotta statues—more than 6,000 life-size soldiers with their horses and chariots, standing in rows to guard the dead emperor.

When archaeologists survey an area to find sites, they will usually examine rodent burrows. Burrowing rodents sometimes uncover artifacts. Such finds in or near burrows might be a clue that other items lie buried in Earth below. Newly plowed farm fields may also turn up buried artifacts.

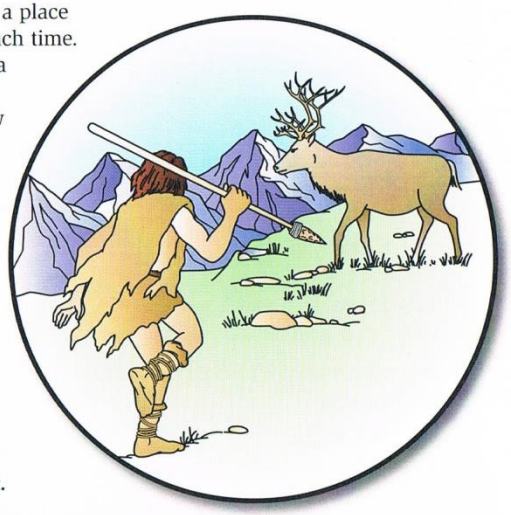
When they have discovered a site, archaeologists thoroughly examine the area before disturbing it. They walk all over the site and look for artifacts and surface features to help them understand what might be found there, as well as how old the site or objects might be. They may dig test pits to get an idea of what is below the surface of the ground. They may use *magnetometry,* which measures changes in the magnetic field that can show features such as hearths, where the ground was once heated by fire. Archaeologists sometimes use ground-penetrating radar and metal detectors to locate buried artifacts, houses, or pits.

Information from the initial survey must be written down so that the site can be found again. Archaeologists often illustrate a site report with photographs, maps, and videos that help explain how a site was found and what it looked like before any excavation was done.

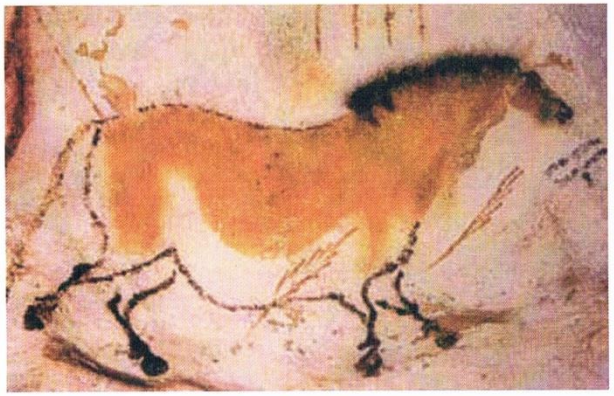
Alone or Together?

A discovery might turn out to be an isolated find—simply an artifact or two left in a place where people did not spend much time. Perhaps an ancient hunter lost a spear far from camp. Maybe a traveler along an old road threw away the container that held his lunch.

The information that can be gained from an isolated find is usually limited to the artifact itself, with little to be learned from the artifact's surroundings.



An isolated artifact such as a hunter's lost spear point usually provides few details about the culture that produced the object.



In 1940 in Lascaux, France, some boys playing in the woods found a hole in the ground. They widened it with their pocketknives and discovered the entrance to a cave. On the cave's white walls were *pictographs*—pictures of humans and animals painted in black, yellow, and red by people who had been there thousands of years earlier.

Images scratched into rock surfaces are called *petroglyphs.* Painted images are called *pictographs.*

Why Shouldn't You Take That Arrowhead?

You are on a Scout hike and you spot an arrowhead. Naturally, you're excited. You want to pick it up to look at it more closely. You want to put that artifact in your pocket and take it home with you as a souvenir.

You found it, but is it yours to take? Before you slip that arrowhead into a pocket, think of all the information that is lost when an artifact is pocketed and removed from the place where it was found. Picking up arrowheads—or bits of pottery or any other artifact—is not as harmless as it might seem.

- A *projectile point* (as archaeologists call arrowheads and spear points) found on the surface of the ground might be evidence that an undiscovered wealth of archaeological information lies waiting at that place.
- By its shape and size, the point could help archaeologists identify which culture left it.
- If the point is made of a material not found locally, it might give clues about whom the people who once lived there traded with, or where they went to quarry their stone.
- The arrowhead might be the key to dating the entire site.

When you take an artifact, you take away a unique clue that the archaeologist might need to determine a site's age, who lived there, or how they lived.

Of greater value are *sites*—locations with a number of objects in the same place, perhaps the remains of fires or houses. A site might be a prehistoric camping area, a village, or a place for storing food. It might be a community that we know about from history, such as an early pioneer settlement or a fort. The artifacts found could be tools, weapons, household goods, pottery, remains of clothing, or trash.

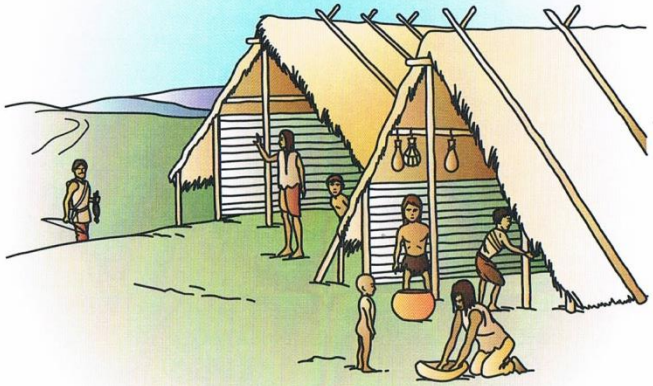
Site Excavation

Although digging is only a part of the scientific process of studying and understanding a site, the work of uncovering artifacts is what many people think of when they think about archaeology. There is an excitement to clearing away centuries of dust or muck and finding artifacts that haven't been seen by humans in hundreds or thousands of years.

But along with that excitement comes a great responsibility to plan and carry out a proper excavation and to preserve every bit of information that can be gathered. Archaeologists work slowly and record everything they observe about the artifacts and the surroundings in which these items are found. If possible, they may leave a portion of the site untouched for future archaeologists to explore with new and better techniques.

The reason for taking such pains is that much of the information a site holds comes not only from the artifacts themselves, but also from how the items are found. Much can be learned from the positions of the items, how close together they are, and in what layers of earth.

Plant remains were uncovered at this 3,800-year-old site along the Iowa River in Coralville, Iowa.



Compared with an isolated find, artifacts found together at a site can provide more information about the people who lived there.

For example, Confederate soldiers killed in March 1862 at Glorieta Pass in New Mexico were buried one over another. Archaeologists excavating the site have taken care to reveal the burials layer by layer so that they can know which artifacts go with which skeleton. In this way, investigators can use the artifacts to identify the soldiers and to learn what job each man did in the army.

Archaeologists are especially interested in trash heaps where people threw out what they no longer needed or wanted. Called *middens,* the piles of trash or garbage often reveal much about the people who made them. There may be shell, bone, and plant remains that show what people ate. Broken plates, bowls, and other ordinary items in middens give an idea of what things people used in their everyday lives.

Keeping accurate records during excavation helps archaeologists learn about the site even after the dig has concluded.

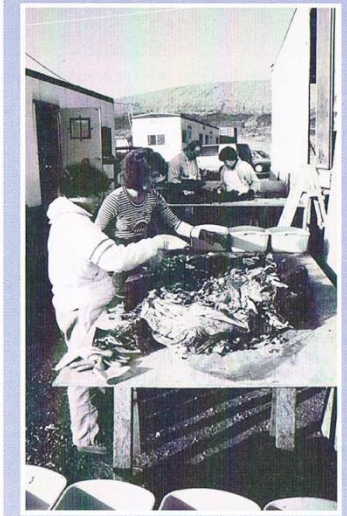
Once it has been moved from the spot where it was found, an artifact can never be returned to exactly the same place. Excavation destroys a site, so data must be recorded before an artifact and its surroundings are disturbed. The records that archaeologists make include site maps, photographs of features like houses and pits, and drawings of artifacts.

When accurate records are kept, archaeologists will be able to study a site even if they were not present during the excavation. Ideally, archaeologists study and write up their findings soon after a site has been excavated. Researchers of the future, however, might want to use new tools and new methods to reexamine the data from an excavation. Accurate records are essential for those future archaeologists who will rely on data gathered today, or even five decades ago, for research that might not be done until many years from now.

The excavation tools used by archaeologists include shovels, buckets, wheelbarrows, trowels, whisk brooms, brushes, and wire screens. Surveyor's instruments are used at large sites that have many excavation areas. At some sites, excavation is done with water sprayed through hoses. Other tools that are just as important are graph paper, notebooks, pencils, cameras, and measuring equipment to record findings as they are being made.

An archaeologist's excavation tools include trowels, whisk brooms, brushes, shovels, buckets, wheelbarrows, and wire screens.

Modern-Day Middens



People today throw out trash, just as people did thousands of years ago. Scientists who call themselves "garbologists" use some archaeological techniques to study modern landfills and trash heaps. They look at what we toss out. From such studies, they can learn what products people use, what they eat, how much they recycle, and what they value.

For a fun project, list the items that you and your family throw away during a week. Then imagine that archaeologists a thousand years in the future find that trash. What will they be able to learn about your family? What will your trash say about the culture in which you live?

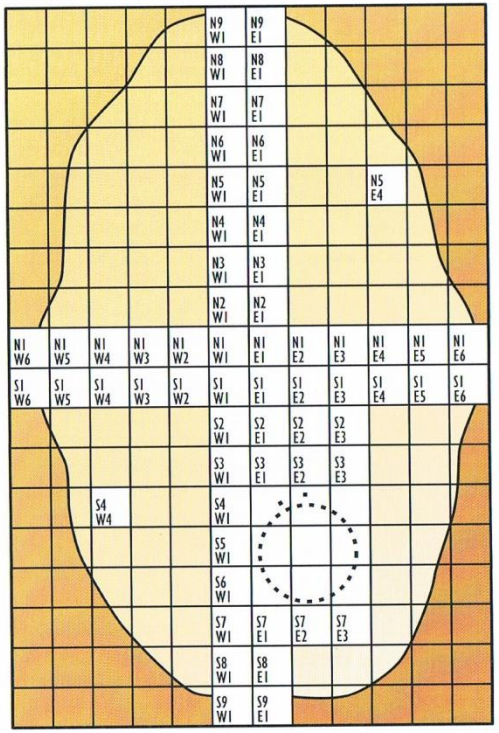
Techniques of Excavation

Archaeologists begin working at a site by establishing a *grid* over the area with lengths of string tied to wooden stakes. They may use a compass or a surveyor's transit to establish straight lines, and a tape measure to space the lines evenly.

An excavation will have a *primary datum point* that is used as a reference point for laying out the squares of the grid. Ideally, the primary datum point is marked permanently so that archaeologists of the future can measure from it and establish exactly where the earlier excavation took place. The marker might be a cement post or a steel pipe, or the datum point might be located on a permanent natural feature such as a rock outcropping.

When it is complete, the grid will look like a big checkerboard. Each square is usually one or two meters (about 3 to 6½ feet) on a side. Each square is given a *grid number.* Anything found within a certain grid square will be given the number of that square. That way, archaeologists can record the exact spot in a site where each artifact is discovered.

Excavators also determine a datum point on the surface of the ground to use in making vertical measurements. Usually, the elevation for each corner of the grid is known. Archaeologists can use the datum point or elevation to measure how deeply in Earth each artifact is buried. An artifact's vertical depth is known as its *depth below datum.*



A grid system helps archaeologists record the exact location where each artifact is found.

Provenience is a word archaeologists use to describe the exact place in a site where an artifact is found. Each artifact's location can be described horizontally by its grid number and vertically by its depth below datum.

This archaeologist and Scout gauge depth by taking a vertical measurement within the grid system.

Working their way down into Earth, archaeologists slowly uncover a site. When they find artifacts, they use small brushes to clear away the dirt. Then they record the grid number and the depth at which an item was found, and any other information about the artifact's position, appearance, and how close it is to other artifacts.

If excavators find a cluster of artifacts, a feature such as a hearth or a campfire, or a piece of a structure such as a wall, post, pit, or floor, they will document what they find even more carefully. They will make photographs and drawings to show how all of the materials relate to one another.

With proper and accurate records and measurements, it is possible to re-create a site on paper. It's also possible to use a computer to develop a three-dimensional figure that shows the relationships between artifacts (objects that can be collected and taken from the field) and features (unmovable elements of a site such as fire pits, houses, storage areas, and burial chambers).

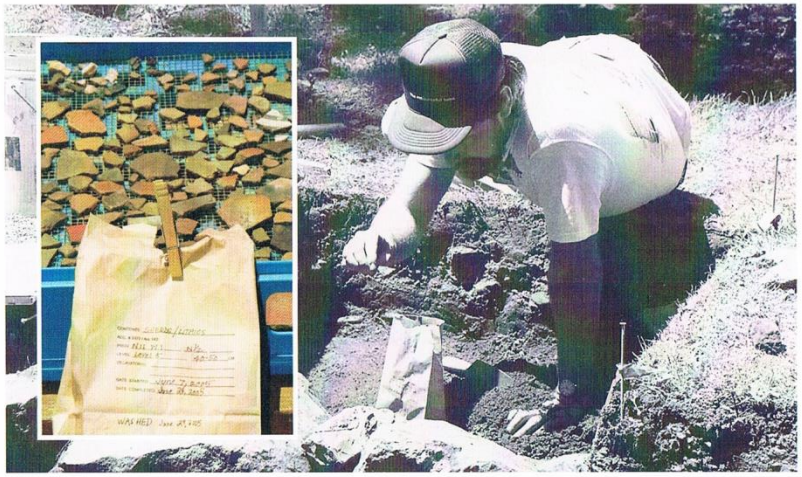
After all information is recorded, each artifact can be placed in a plastic or paper bag. The bag is carefully labeled with information about the object—the site number, grid number, depth below datum, date of the excavation, and names of the archaeologists. This process preserves information about what was found together.

Soil that seems to contain no artifacts is sifted through a wire screen. Sifting may reveal small artifacts, bones, charcoal, tiny flakes or chips of stone (the leftovers of stone tool making), and other fragments that might otherwise be overlooked by excavators. A sample of soil may be washed in a process known as *flotation* to separate out any seeds or plant remains (clues to what plants people were eating).

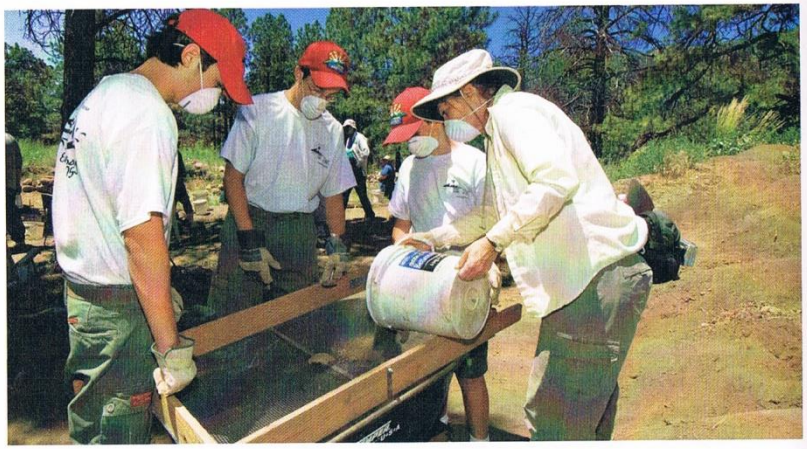
Keeping Things in Context

When archaeologists excavate a site, they search for clues that can help them piece together the lives of the people who used that bit of ground. They attempt to establish the *context* of the site—where artifacts were found, how the items relate to one another, and what the site as a whole reveals about the people who were once there.

For example, an excavator who finds a clay bowl in the living area of an ancient house might conclude that the bowl was a simple household object with no special meaning. If the bowl were found in the tomb of a king or on the altar of a ruined temple, however, the excavator may determine that the bowl might have had sacred or ritual meaning.



After all information is recorded about the exact spot where an artifact was found and the *context* in which it was found, the item can be removed from the earth, bagged, and labeled.

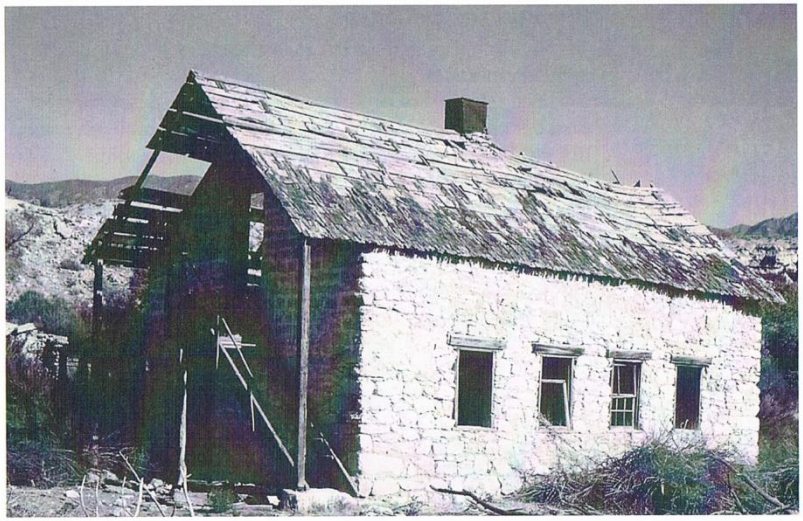


Soil from a site is sifted through a screen to reveal small artifacts.

By carefully recording the context of a site, archaeologists can gain information that helps to tell the full story of the people who lived there. Researchers consider lots of evidence as they establish a site's context. Among the important factors are the *formation processes* that shaped the site.

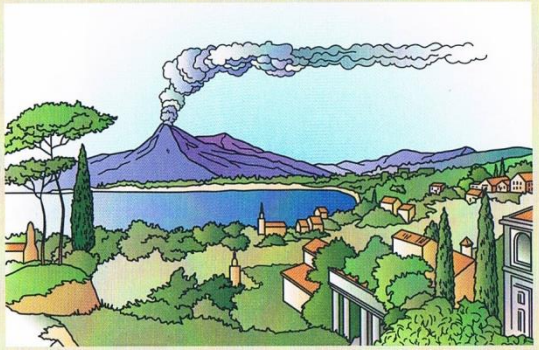
Sites are created by the activities of everyday living and by the reuse of a site over time. Trash is tossed in the same place day after day, creating a midden. Rooms are lived in, eventually abandoned, and possibly reoccupied by later arrivals to the area. If a room is reoccupied, the new owners may clear away debris and discard artifacts some other place.

In most cases, formation processes are gradual. New buildings are erected on the ruins of old structures. Dust carried by the wind slowly covers the remains of an abandoned homestead on the prairie. As the years pass, such factors as erosion and changes in climate can affect the appearance of an area and the locations of artifacts within a site. Though quite rare, catastrophic events such as fires, floods, avalanches, and volcanic eruptions may drastically reshape an area. By paying attention to the formation processes that have been at work, archaeologists can better understand the context of a site.



Change may come gradually, as wind and erosion slowly reshape a site. Time has taken a toll on this abandoned rock house near Littlefield, Arizona.

Catastrophic formation processes sometimes happen suddenly. In the year A.D. 79, the volcano Mount Vesuvius erupted above the ancient towns of Pompeii and Herculaneum in Italy. Hot volcanic ash buried the cities, killing most of the people and then hardening around their bodies. The sites were discovered in 1711. Excavations of the cities continue even today, yielding a clear picture of life in Pompeii and Herculaneum at the moment the volcano erupted. Archaeologists have found Pompeii well-preserved under the blanket of volcanic ash.

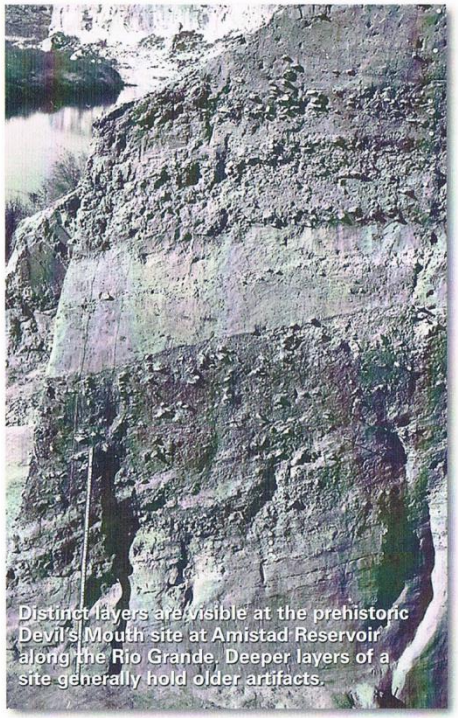


Reading the Evidence

Two important principles in archaeology are *association* and *superposition.*

The *principle of association* says that artifacts found together were probably used together and are probably about the same age. An archaeologist who discovers a stone tool buried next to a piece of pottery can make a good guess that the tool and the pottery are about the same age and that people probably used both items at about the same time. The principle of association would lose its value if somebody were to move the tool before recording where it lay in relation to the pottery. If that happened, an archaeologist might never know that the pot and the tool were closely related.

The *principle of superposition* says that the deeper an artifact is buried, the older it is. Over the years, layers of earth, debris, trash, and other materials build up in a site. *Stratigraphy* is the order in which layers have formed in a site. The oldest artifacts will be in the bottom layers, while artifacts in the layers above will be younger.



Distinct layers are visible at the prehistoric Devil's Mouth site at Amistad Reservoir along the Rio Grande. Deeper layers of a site generally hold older artifacts.

However, artifacts can move within layers. Objects are sometimes displaced by burrowing rodents. Objects may move due to movements of the soil itself, such as *frost heaving*—water in the soil freezes and pushes earth upward. Artifacts may also be moved by later generations of people. Perhaps an Apache picked up an old spear point for his medicine pouch, or a miner used a prehistoric grinding stone to build the foundation of his cabin. Of course, if a pothunter digs into a site and makes no record of which artifacts were in which layers, vital information about the age of the items will be destroyed.

13,000 B.C. | 12,000 B.C. | 11,000 B.C. | 10,000 B.C. | 9000 B.C.

ca. 38,000–10,000 B.C. Stone Age people come to North America.

ca. 14,000 B.C. Early immigrants, possibly from Europe, leave stone tools at the Topper site in South Carolina.

ca. 13,000 B.C. Stone Age artists paint animals on walls and ceiling of Lascaux cave in France.

ca. 10,000 B.C. The Clovis people live in the Americas.

ca. 9000 B.C. Desert American South the first people weave baskets

6000 B.C. | 5000 B.C. | 4000 B.C. | 3000 B.C. | 20

ca. 6000 B.C. First evidence of domesticated plants—corn, beans, squash, potatoes—in South America.

5000–1000 B.C. Some American Indian groups settle into semipermanent villages.

3500–2000 B.C. People begin farming in much of Mexico and Central America.

ca. 3300 B.C. A man dies in the Alps of Europe and a glacier covers his body.

ca. 3000 B.C. Sumerian scribes invent *cuneiform* (wedge-shaped) writing.

ca. 3000 B.C. Earliest known pottery in the Western Hemisphere.

ca. 3000 B.C. Hieroglyphic writing develops in Egypt.

ca. 2800 B.C. Construction of Stonehenge begins in southern England

ca. 2500 B.C. Egypt's colossal pyramids

ca. 900 Ne

ca. 900 an

Important Events and Major Discoveries in Archaeology

These time charts show where scientific theory places the events and archaeological discoveries discussed in this pamphlet in the grand sweep of time. Notice how much longer the chronology is for the period before 30 B.C. than for the years since A.D. 30.

ca. = circa (approximately)

9000 B.C. — 8000 B.C. — 7000 B.C.

ca. 9000 B.C. Desert dwellers of the American Southwest are among the first people in the world to weave baskets.

ca. 8000 B.C. Hunter-gatherers in Europe begin to build shelters, live in settlements, bury their dead.

ca. 8000 B.C. Big-game hunting declines as huge animals like the mammoth begin to disappear from North America at the end of the Ice Age.

ca. 8000 B.C. Jericho in Jordan is world's oldest known walled city.

ca. 7300 B.C. Kennewick Man dies on the banks of the Columbia River in southeastern Washington.

ca. 8800–8200 B.C. Folsom people live in what is now New Mexico.

2000 B.C. — 1000 B.C.

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writing

800 B.C. Construction of Stonehenge
begins in southern England.

ca. 2500 B.C. Egypt's rulers build colossal pyramids at Giza.

ca. 2000 B.C. Earliest known pottery in North America.

ca. 2000 B.C. Bronze Age begins in Europe and the Nile Valley.

1361 B.C. Tutankhamun ascends Egypt's throne.

ca. 1270 B.C. Temples of Pharaoh Ramses II and Queen Nefertari built at Abu Simbel.

ca. 1200 B.C. The Olmec begin to develop Mexico's first known civilization.

ca. 1020 B.C. The Israelites unite under King Saul.

ca. 1000 B.C. The Adena people of the Ohio Valley in North America begin to build mounds over the graves of their leaders.

ca. 950 B.C. The Temple of Solomon is built in Jerusalem.

776 B.C. The Greeks host the first Olympic Games.

753 B.C. Rome is founded.

597 B.C. Chaldeans conquer Jerusalem.

ca. 563 B.C. Buddha is born.

ca. 500 B.C. Confucius teaches in China.

432 B.C. The Parthenon is completed in Athens.

400 B.C.–A.D. 500 Hopewell Indians bury their dead in earthen mounds in the Ohio Valley.

335–327 B.C. Alexander the Great conquers Egypt and Persia.

221–210 B.C. China's first emperor, Qin Shi Huangdi, builds the Great Wall.

30 B.C. After Cleopatra's death, Egypt becomes a Roman province.

A.D. 1–1199

ca. A.D. 30 Jesus of Nazareth is crucified at Jerusalem.

A.D. 79 Mount Vesuvius buries Pompeii and Herculaneum.

A.D. 105 The Chinese invent paper.

100–750 Civilization flourishes in Mexico, centered on Teotihuacán, the first metropolis in the Americas.

250–900 Maya civilization flourishes in much of Mexico and Central America.

476 The Roman Empire falls.

ca. 570 Muhammad is born.

ca. 800 First mounds are built at Cahokia in what is now Illinois.

ca. 900 The Anasazi build large, multiroomed pueblos in the American Southwest.

ca. 1000 Vikings establish short-lived villages on the northern coast of North America.

ca. 1040 The Chinese print books using movable type.

ca. 1100 Easter Islanders erect giant stone statues.

A.D. 1200–1699

ca. 1200 The Incas establish their capital at Cuzco in Peru.

ca. 1200 The Anasazi abandon their homes in the Chaco Canyon region.

1271–95 Marco Polo travels in China.

1325 The Aztecs establish their capital, Tenochtitlán, in Mexico.

1492 Columbus arrives in America.

ca. 1500 Mudslides bury Makah village at Ozette in what is now Washington State.

1521 In Mexico, the Aztec Empire falls.

1532 In South America, the Inca Empire falls.

1539–42 Hernando de Soto explores parts of the Mississippi Valley.

1540 Francisco Vásquez de Coronado finds Zuñi pueblos in the American Southwest.

1607 Jamestown, Virginia, the first English settlement on the American mainland, is founded.

1620 The Pilgrims establish Plymouth Colony in Massachusetts.

1686 La Salle's ship *Belle* runs aground off the Texas Gulf Coast.

A.D. 1700–Present Day

1775–83 The American Revolution.

1799 The Rosetta Stone is discovered in Egypt.

1822 The Rosetta Stone is deciphered.

1911 American explorer Hiram Bingham finds ruins of Machu Picchu, Inca city in Peru.

1922 Tutankhamun's treasure-filled tomb is found in Egypt's Valley of the Kings.

1927 Folsom point is discovered near Folsom, New Mexico.

1940 Four boys find 15,000-year-old cave paintings in Lascaux, France.

1940s Radiocarbon dating is first used to determine the age of organic substances.

1963–68 UNESCO project rescues the temples of Pharaoh Ramses II at Abu Simbel.

1970s Archaeologists unearth the 500-year-old Makah Indian village at Ozette, Washington.

1974 Well diggers discover the tomb of Qin Shi Huangdi, China's first emperor.

1978–82 The Great Temple of the Aztec capital, Tenochtitlán, is excavated in Mexico City.

1980 Human remains from the Roman era are studied at Herculaneum, Italy.

1991 Hikers in the Alps find the 5,300-year-old body of the Iceman.

1995 Marine archaeologists find La Salle's ship *Belle*.

1996 Boat-racing fans on the Columbia River find the 9,300-year-old skeleton of Kennewick Man.

To Dig or Not to Dig

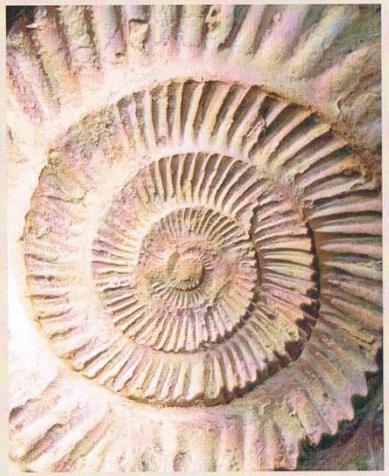
Archaeologists do not excavate every site they locate. Sometimes they must decide which sites are most likely to answer their questions about a particular problem, and then excavate only those sites.

Perhaps there are historical records for some early settlement, like Jamestown, Virginia, but the accounts are vague or incomplete. Archaeologists may decide to excavate a site to get answers to specific questions that the written record doesn't cover.

Or maybe there are sites facing certain destruction that require careful but quick excavation. In a situation, for example, where 50 sites will be damaged by a highway construction project, archaeologists might investigate only a representative sample of those sites, and then actually excavate only a few. This is done to keep from getting a lot of the same information and to reduce the overall costs of the project.

Archaeologists also know that some finds are better left undisturbed. Museums don't always preserve archaeological finds as well as the items would have been preserved if they had simply been left in the ground. It's also likely that methods and techniques not yet developed will prove to be better than those now used.

For all of these reasons, archaeologists may decide not to excavate a known site. In any case, they have a responsibility to justify a dig—to explain why they are excavating particular sites and what they expect to learn from their investigations. Archaeologists must have specific research questions in mind before they dig, and the excavation must be guided by a well-thought-out plan of research.



Artifact Identification and Examination

The time archaeologists spend in the field finding and excavating sites is short compared with the time they must spend in the laboratory analyzing artifacts and writing about their findings. Much of the work of archaeology, and much of the excitement of discovery, happens in the laboratory.

When artifacts arrive at an archaeological lab, they are cleaned and labeled. A code number may be written directly on each item or on a tag attached to it. Code numbers allow researchers to connect the artifact to the records made during the excavation and to compare artifacts from different layers or locations without the risk of mixing them up.

In the laboratory, archaeologists examine each artifact and try to figure out what it is, what it is made of, how old it is, and what it was used for, among other things. New finds are compared with already identified materials. A site may yield hundreds or thousands of artifacts—far too many for each item to be compared individually with every other item found. Therefore, archaeologists classify or categorize artifacts, grouping items into similar categories. They might group together stone flakes from a site, or charcoal, pottery shards, or spear points.

Then they can compare the categories with other artifact collections to see if the items found in a certain site are similar to or different from those found elsewhere. Comparisons can help archaeologists make educated interpretations about whether the people who left one set of artifacts were also active in other locations, or whether different groups were doing the same kinds of activities.

Archaeologists spend much of their time in laboratories, examining and categorizing artifacts. After artifacts have been sorted and analyzed, they are carefully stored.

Artifacts that are similar in material and appearance might be hard to tell apart at first glance. So archaeologists look for identifying clues. For example, modern investigators have learned a great deal about how early Americans made arrowheads and spear points (or *projectile points,* as scientists call them). When a point is found, archaeologists can compare it with their artifact records. The shape and size of a projectile point and the stone from which it was formed (commonly flint, obsidian, chert, or quartzite) may reveal who made it and when.

The material and the process used to make a projectile point, as well as the point's size and shape, are clues to the culture that produced it.

Other clues to the origin of a projectile point may lie in the way it was made, a process called *flint knapping.* Typically, arrowhead makers hammered a chunk of flint with a stone tool to remove most of the unwanted material and roughly shape the point. For detail work, such as thinning, fine shaping, and finishing a point's sharp edge, they pressed a piece of bone or antler against the flint to break off small flakes. Flint-knapping methods leave distinctive marks on projectile points. To an archaeologist, these marks are almost like fingerprints in identifying the method used.

Investigators also learn much from pottery. Through the ages, people have used pots for cooking and for storing food, water, grain, and other items. When the pots broke, their owners often threw them out with the garbage. Although a pot might be fragile and easily broken, the fired clay used to make pottery can survive hundreds and even thousands of years, especially if it is buried in a trash pit or midden where it is protected from the weather.

The different shapes and markings of clay pottery can reveal much about the people who made the pots. These two ceramic vessels were recovered from a prehistoric Caddoan village in Cass County, Texas.

Different groups of people made pots in distinctive ways. Archaeologists often can recognize the special shapes and markings that various groups have used on pottery. Geologists can help identify where the clay used in a pot was originally found. Sometimes the pieces of a broken pot can be put back together. If not, archaeologists may be able to measure several pieces and use the measurements to determine the original size of the pot. Knowing the size can help them understand how and when the pot was used, and by what group.

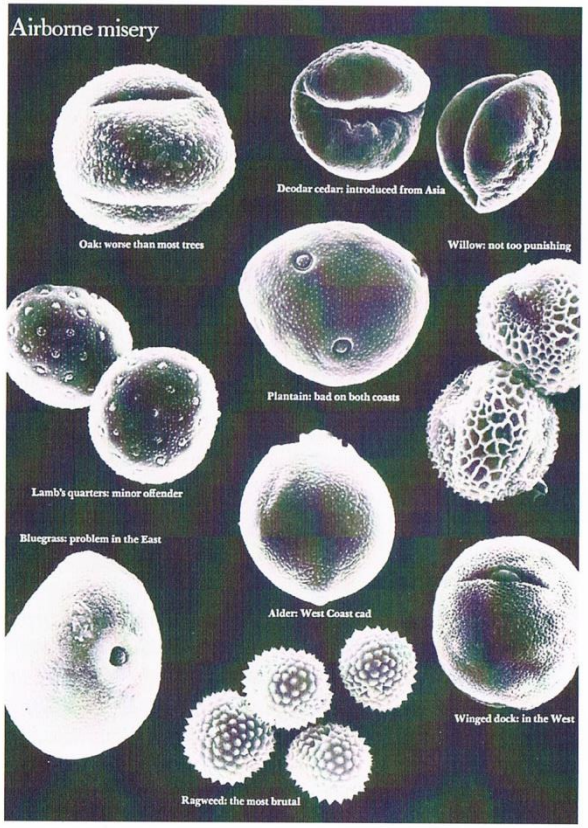
Less common than stone tools or clay pots are perishable artifacts made of wood, plant fibers, animal sinew, and other *organic* materials (materials that were once living). These objects excite particular interest because they are so rare. Dry caves occasionally yield well-preserved baskets, bits of cloth, and wood carvings. Sealed tombs may contain wooden furniture and linen fabrics. Leather clothing, natural-fiber ropes, and even entire human bodies may be preserved through a natural tanning process in peat bogs. In some cases, artifacts may be covered with a protective layer of mud or frozen in glacial ice.

Perishable artifacts may crumble and turn to dust at the slightest touch, or disintegrate when exposed to air. Some objects are so fragile that efforts must be made to preserve them in the field, before investigators can begin to examine them in the laboratory. Preservation techniques will be covered in more detail later in this section.

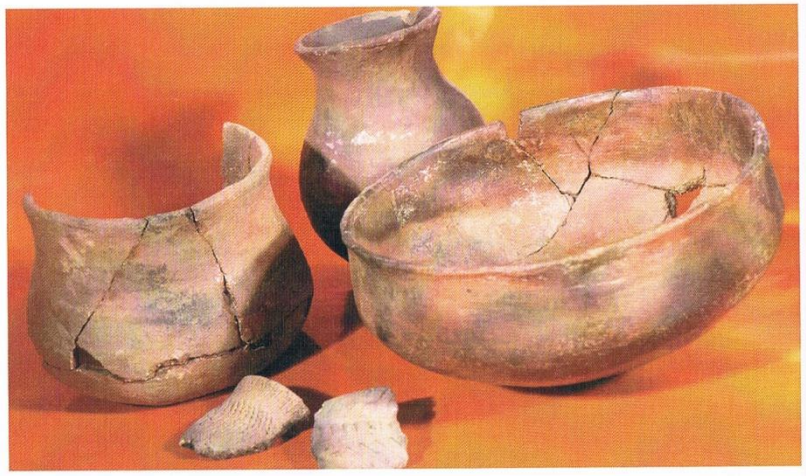
Pollen Analysis

It might surprise you to learn that something as ordinary as the pollen from flowers, trees, and grasses can be useful to archaeologists. Pollen from different types of plants looks different and can be identified when viewed under a microscope. Carried by the wind and by insects, great amounts of pollen may settle in an area, then be covered by dust or other formation processes.

Archaeologists may use pollen to identify what people ate and what they grew in their fields. The presence of corn pollen in a site, for instance, indicates that the people grew corn for food. The presence of pollen in a burial site may suggest that the people placed flowers on the graves of their dead. Pollen analysis of a Stone Age grave site in Iraq showed that the dead man's body had been covered with eight different types of flowers, including hollyhocks.



From pollen grains, researchers can tell what plants grew in an area, what plants people used as food, or what kinds of flowers they put on the graves of their deceased. Note the various shapes and surface textures of these pollen grains.



Dating Artifacts

Archaeologists have several ways to figure out how old artifacts, structures, and sites are. If they know the date of one site, they can assume that another site with the same kinds of artifacts is about the same age. For instance, if they know that a certain kind of pottery found in site A was made 500 years ago, archaeologists can be fairly certain that pieces of the same pottery found in site B were made at the same time.

Stratigraphy (the order of layers in a site) provides another dating method. Artifacts buried in deeper levels of a site are usually older than items above them. If archaeologists know the age of one level, they can determine that artifacts beneath that level were probably left at an earlier date.

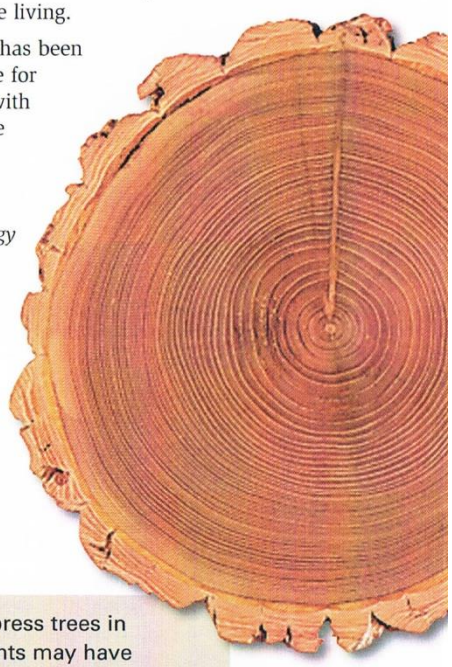
These ways of estimating the ages of artifacts are called *relative* dating techniques because the date of one artifact or site is related to the date of another artifact or site. Powerful scientific tools exist for more accurate dating—that is, for assigning an estimated age to an artifact or a site. Among the most used dating techniques are the following.

Radiocarbon Dating. All living things have carbon in them. After a plant or animal dies, its carbon 14 (a type of carbon) slowly decays into carbon 12. Scientists believe that, after 5,730 years, half of the carbon 14 still remains; after 11,460 years, only one-fourth is left.

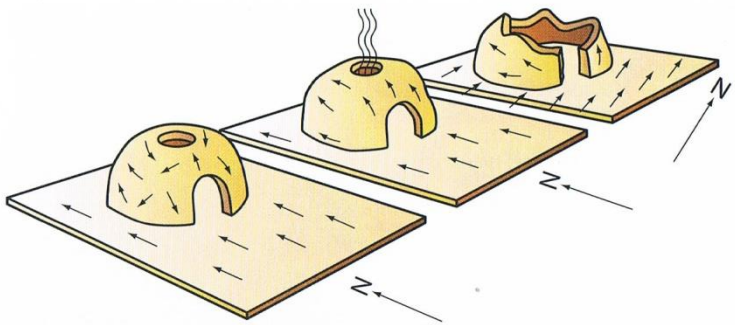
In 1949, scientists discovered a way to use the rate of carbon 14 decay to estimate the age of artifacts that contain carbon. Today, radiocarbon dating is one of the most popular methods for estimating the age of wood, ashes, bones, plant remains, and other items that were once living.

Dendrochronology. Look at a log that has been sawn in half and you will see rings, one for every year the tree was alive. In years with good growing conditions, the rings were wide. If there was a drought, the rings were narrower. A fire might have left a scar on one or more rings.

Dendro means "tree" and *chronology* means "time." Scientists can analyze the growth rings of trees in an area and use the rings to make a chart of time. They can then look at logs used long ago as firewood or as beams to hold up the roof of a house. By matching the rings on the logs or wooden beams with the growth rings of trees whose ages are known, it is possible to tell when the wood of the logs or beams grew. That gives the age of the campfire or the house.



Studies of growth rings in bald cypress trees in Virginia suggest that severe droughts may have devastated the Roanoke colony of the 1580s and the Jamestown settlement of the early 1600s. The studies, published in 1998, show that the first years at Jamestown —dubbed "The Starving Time"—were the driest years in many centuries. The droughts caused deadly hardships including famine for both groups of English colonists, and may have helped to wipe out Roanoke. The 120 people of the Lost Colony disappeared without a trace in only three years.



Iron particles in heated clay or soil align with Earth's magnetic field. Because the magnetic north pole changes location with time, archaeologists can use the alignment of the iron particles to figure out the age of a hearth or, as in this illustration, a clay pottery kiln. Archaeologists call this technique *magnetic dating.*

Archaeomagnetism. You know that a compass needle lines up with Earth's magnetic north pole. In the same way, iron particles in heated clay or in soil such as the floor of a hearth align with Earth's magnetic field. When the clay or soil cools, the particles are locked in that alignment.

Over the centuries, the location of the magnetic north pole has drifted hundreds of miles. Geologists have charted the pole's travels, pinpointing where it has been at specific times over thousands of years. By analyzing a hearth found in a site, it is possible to figure out which direction the iron particles in the soil were being pulled when the particles, heated by fire, aligned with the magnetic north pole. Using the geologists' map of pole migration, archaeologists can estimate the hearth's age.

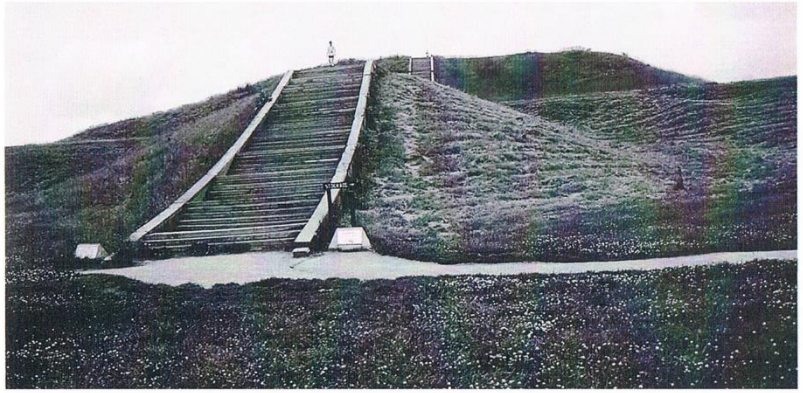
For more about Earth's magnetic field, see the *Electricity* merit badge pamphlet.

Documentation. Historical accounts and settlement records may contain information that pinpoints dates of artifacts. For example, in 1609 a man visiting the Jamestown settlement in Virginia drew a map of that village, the first English settlement in North America. Archaeologists today use the old map as one source to help them find the remains of the early walls and buildings of Jamestown.

Obsidian Hydration. A less reliable dating method is obsidian hydration. Obsidian is a volcanic glass. Because it can be broken and shaped into cutting tools with very sharp edges, many ancient peoples used obsidian to make knives and arrowheads.

Many ancient peoples discovered that they could use obsidian—a volcanic glass—to create cutting tools with razor-sharp edges.These obsidian arrowheads come from the Nightfire Island site in Oregon.

When obsidian is broken, the freshly exposed, clean surfaces absorb moisture. The rate of absorption depends heavily on the climate—some areas are more moist than others. Sometimes, scientists can study an obsidian artifact under a microscope and tell by the amount of moisture it has absorbed how old it is. Because the rate of absorption may vary greatly, however, this dating method can be unreliable.



Monks Mound is a prehistoric Mississippian site at Cahokia, near East St. Louis, Illinois.

Interpretation

From excavating sites and analyzing artifacts, archaeologists get raw data: facts. The next step is interpretation—the process of giving meaning to the data.

Imagine an arrow point found at Cahokia, the site of a large and complex prehistoric American Indian community in present-day Illinois. Analysis shows that the point was made of chert from Arkansas, but the style of the point indicates that it was made in Oklahoma. One interpretation of this data is that the Cahokians traded over long distances.

By interpreting the great body of material that has been recovered from Cahokia, archaeologists have formed many ideas about how the Cahokians traded, farmed, fished, hunted, celebrated, built houses, defended themselves, and otherwise met their basic needs.

The ways in which groups of people have satisfied their basic needs have differed from place to place and through the ages. These differences have made each culture—like the culture of Cahokia—unique. These differences have led to the rich mix of human cultures that we see around the world today.

Archaeologists studying sites and artifacts are interested in how people of the past fulfilled their basic needs. As they interpret how various groups lived, archaeologists help us better understand how our own culture has been built on the foundations of cultures that came before.

Through the study of the past, we can see how various groups of people rose to the challenge of everyday living and found ways to satisfy their needs and solve the problems they faced. We can also see how some groups failed in their efforts, and perhaps we can learn from those failures.

All people have basic needs, no matter when or where they live. Among the most important of people's basic needs are

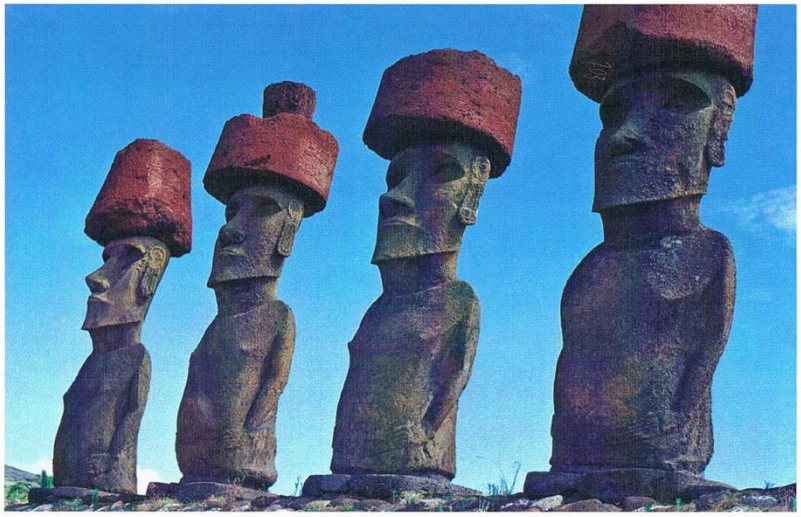
- The need for water and food
- The need for shelter from the weather (housing and clothing)
- The need to understand and adapt to the world through their culture, including lifeways, philosophy, science, and religion
- The desire to pass on their culture to their children and future generations

A Scout Troop's Archaeological Good Turn

An archaeological site in an area overseen by the Bureau of Land Management was being damaged by wandering livestock. A Scout troop from a town nearby volunteered to help build a fence around the site.

For several days, the Scouts worked on the fence. To thank them for their efforts, the BLM arranged for the Scouts to spend time with archaeologists and other specialists who studied the site inside the fence. The Scouts got to practice some experimental archaeology by learning the basics of flint knapping to make arrowheads. They also learned about the American Indians who had lived at the site hundreds of years earlier.

The fence that the Scouts built still protects the site. The Scouts also have a new respect for the ancient people whose home was not far from their own. As protectors of the past, they have enriched their own present.



Experimental archaeologists on Easter Island set out to show how the huge stone heads might have been made and moved.

Ethnographic Analogy and Experimental Archaeology

The people archaeologists study are no longer around to explain how they made and used the artifacts they left behind. Two methods that researchers can use to interpret past lifeways are *ethnographic analogy* and *experimental archaeology.*

What's an ethnographic analogy? You can get an idea by looking at the two parts of the phrase. *Ethnography* is a branch of anthropology dealing with individual cultures. To make an *analogy* is to assume that if two things agree with one another in some ways, they probably will agree in other ways as well.

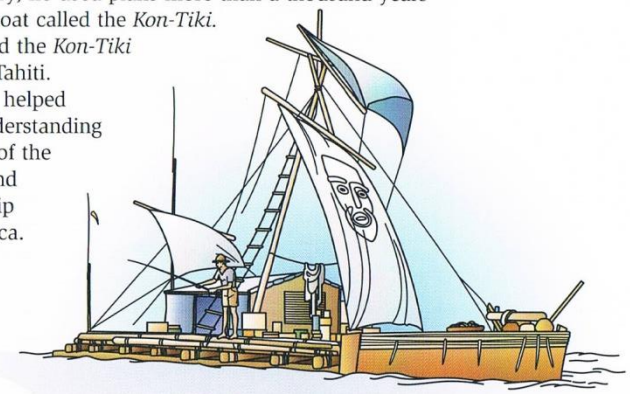
So, if two cultures are alike in some ways, they probably will be alike in other ways. To find clues about how people lived in the past, researchers can study the native peoples who still live in an area or who make items similar to artifacts that have been found in archaeological sites. No groups like the earliest hunters still live in North America, for example, but hunting peoples do live today in Australia and Africa. Those groups can give us information on hunting techniques and tool making, which—by analogy—we can use to interpret and better understand the habits and activities of ancient peoples.

In the second method—experimental archaeology—researchers try to re-create the items in question. Scientists can gain a greater understanding of ancient tools, weapons, pottery, fabrics, baskets, and other artifacts by trying to produce similar items themselves.

For example, experimental archaeologists might gather the same kinds of plant fibers used to make ancient baskets, then try to figure out how to weave the fibers into baskets similar to those found in excavated sites. By experimenting with plant fibers, they may discover how long it took to make a basket and which fibers were best for different kinds of baskets.

Experimental archaeologists might also try making pottery from the same clays prehistoric peoples used to learn how hot the fire needed to be, what firewoods worked best, and how many pots typically broke during the firing. Or they might experiment with different methods of chipping flint to shape it into points for arrows and spears.

Sometimes, these experiments turn into great adventures. A Norwegian explorer and writer named Thor Heyerdahl believed that, long ago, people sailed across the Pacific Ocean from South America to the islands of Tahiti, Fiji, and Easter. To test his theory, he used plans more than a thousand years old to build a boat called the *Kon-Tiki.* Heyerdahl sailed the *Kon-Tiki* 4,300 miles to Tahiti. His experiment helped expand our understanding of the cultures of the South Pacific and their relationship to South America.



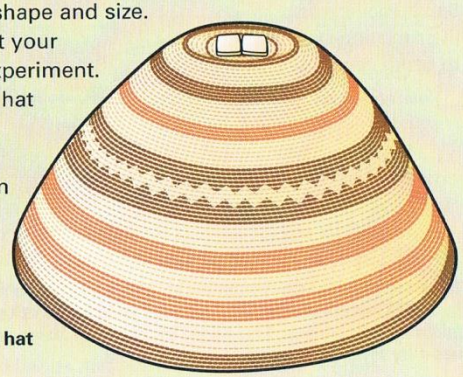
To show that South American Indians could have migrated to Pacific islands, in 1947 Thor Heyerdahl and a small crew sailed the *Kon-Tiki* from Peru to the islands of Polynesia. The *Kon-Tiki,* made of balsa, was modeled after rafts used by Peruvians in ancient times.

Your Own Experimental Archaeology

For requirement 9b, you are to use the methods of experimental archaeology to re-create an item or to practice a skill from the past. Some merit badge skills may come in handy to fulfill this requirement. Consider Basketry (weaving a basket such as one an early American might have used), Indian Lore (making items associated with a particular tribe or demonstrating traditional methods of hunting or fishing), Pioneering (rope making), Pottery (making a clay pot or figurine), Textile (weaving a belt or headband), or Wood Carving (carving a decorative or useful or item).

Plan your experimental archaeology project to help you answer a question about a culture that interests you. For instance, maybe you would like to know how the Makah Indians of northwestern Washington have made their distinctive cone-shaped rain hats. Begin by studying pictures or, if possible, a museum exhibit that shows some hats in detail. Try to see how they are constructed. Get a supply of suitable materials (see the *Basketry* merit badge pamphlet for tips). Then practice until you have re-created a rain hat of similar shape and size.

Try out your finished experiment. Does your hat keep your head dry outdoors in the rain?



Traditional Makah rain hat

Preservation

Once objects have been excavated, they must be preserved so that they do not decay any further. In the field, archaeologists must sometimes act quickly to protect artifacts as soon as they are uncovered. Upon opening a tomb at Jericho, for example, archaeologists discovered that all of the wooden furniture in the tomb was crumbling to dust upon exposure to the air. To save it, they coated the furniture with wax to seal it from the air.

In cases other than emergencies, most conservation work is done in laboratories. Specialists called *conservators* use a variety of techniques to clean objects, stop the chemical and biological processes of decay, and protect the artifacts so that no more decay happens.

Some organic materials must be kept cold to prevent decay. The Iceman's body, for example, is kept in a refrigerated display case in a museum in Italy.

An Imperfect Picture

Even in dry climates, the perfect preservation of all items that people once used is rare. Many objects rot and disintegrate, leaving no trace for an archaeologist to find. Therefore, investigators get only an imperfect picture of past cultures. Putting the picture together from an incomplete set of clues is like trying to assemble a jigsaw puzzle that has many pieces missing.

Try this: Make a list of all of the objects found in your bedroom. Then mark through every other item on your list.

If Scouts of the future could examine all of the items on your first list, what would they be able to learn about you? If they could look at only the objects on your second, incomplete list, how might their ideas about you be different? What would they learn about you and your life if they had only a partial or fragmentary set of objects from your bedroom to study? Do you think they would get an imperfect picture of who you are?

This is the same problem that archaeologists face. Large gaps often exist in the evidence they collect, making it impossible to build up a complete picture of the people they are studying.

The conservation and curation (long-term care) of archaeological finds has become a highly specialized field. If the few details given here have piqued your curiosity, you can learn more by talking with the curator of a local museum. The curator can explain the uses of special preservation materials such as acid-free paper, and show you how temperature and humidity are controlled inside display cases, how maps and papers are stored, and how fragile objects are handled to avoid damage.

Conserving Organic Materials

Organic materials such as wood and leather that have soaked up water become soft and weak. They deteriorate rapidly when exposed to the air. It is important to keep such artifacts from drying out and cracking. To preserve them, conservators may place the objects in tanks of water or wrap them in plastic to keep them damp and away from the air.

Treatment may also involve applying special chemicals or bathing the artifacts in warm, liquid wax. The wax slowly replaces the moisture in wood and leather, then hardens, which strengthens the objects and keeps them from rotting. This treatment was used to preserve the leather and wood objects that belonged to the mummified Iceman found in the Alps in 1991.

Organic materials can also be freeze-dried—the same process used to make instant coffee granules. Materials are first frozen, then placed in a vacuum chamber where the ice crystals turn to gas; over a period of weeks, the gas is drawn off. Once dried, the artifacts are strong enough to be handled. Conservators use freeze-drying for preserving artifacts such as the wooden bowls soaked with seal oil that came from the Ozette site, and items of grass that were found with the Iceman.

Conserving Metal

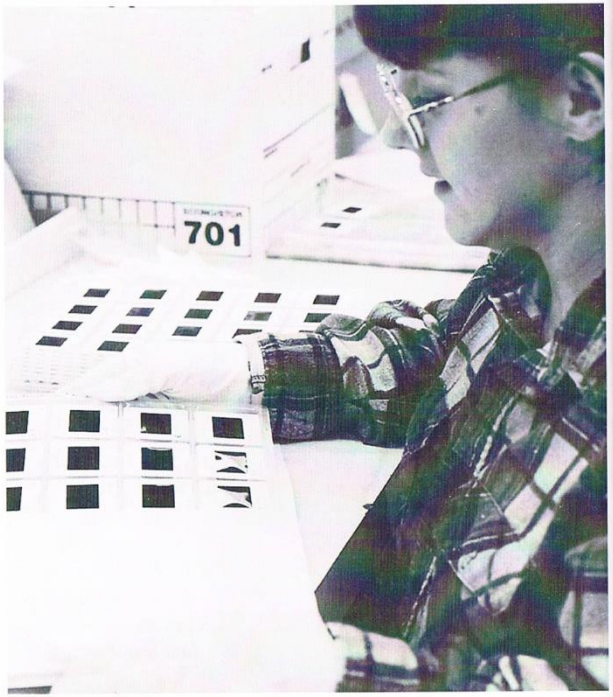
Metals react with oxygen to form metal oxides such as iron oxide (rust). This process breaks down the structure of the metal. Most metal artifacts come out of Earth badly decayed and encrusted with oxides.

To clean metal objects, conservators may spray them with a jet of hard particles to scour away the rust. Chemicals may also be used to remove encrustations and stop further rusting. Then a sealant, such as a protective coat of polyester resin, may be applied to the artifact.

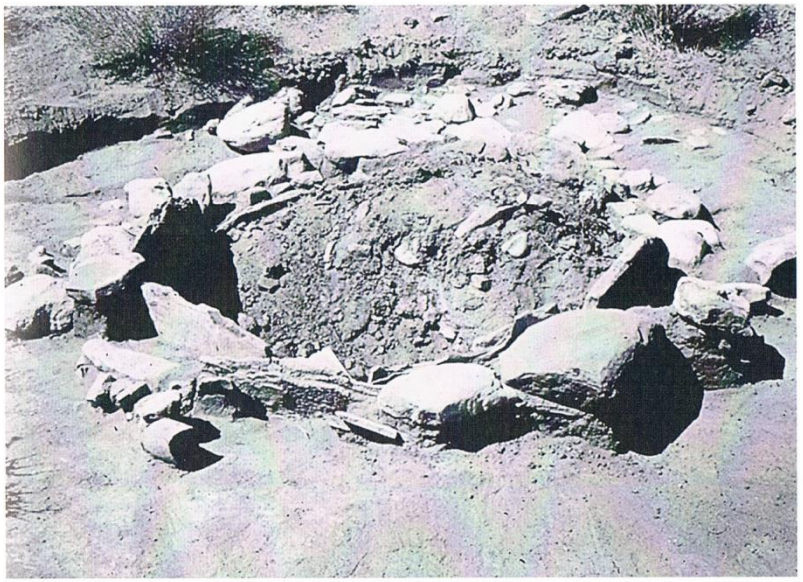
Artifact Storage

Artifacts are cataloged and stored so that they can be located easily by people who want to study them. Fragile items such as old clothing or paper documents may require storage where exposure to light and other conditions can be controlled.

Ultraviolet light is harmful to nearly all organic materials. Direct sunlight is the most damaging, but some types of artificial lighting can also produce UV light. Special lightbulbs and lighting techniques may be used to protect artifacts from UV damage. Objects must also be protected against damage from heat, humidity, desiccation (drying out), dust, rodents, and insects.



Paper records and photographs of excavations are preserved in special acid-free containers.

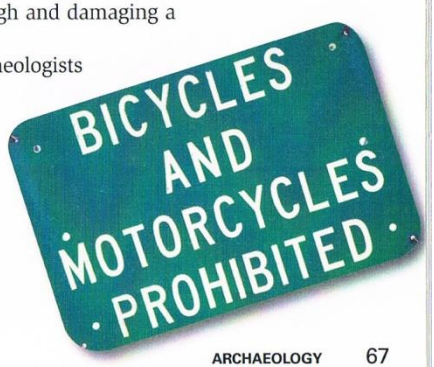


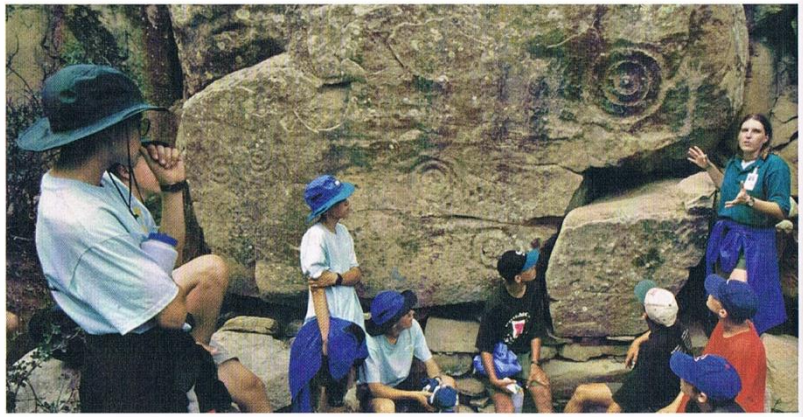
Vandalized site at Zion National Park, Utah

Site Protection

It may take months or even years after a site has been discovered before it is fully excavated. At times when archaeologists are not actively working at a site, the area may be in danger from pothunters illegally searching for treasures. Rain and wind might erode the soil. People in motor vehicles or on bicycles might not realize that they are going through and damaging a sensitive area.

Volunteers often are able to help archaeologists protect sites and monitor the condition of a site until excavation can be completed. Volunteers might visit a site once a month to make a written and photographic record. They might help build barriers to keep out people and animals. Or they might assist in concealing a site so that it does not attract attention.





Archaeologists often speak to groups at parks and other sites that attract visitors.

Information Sharing

Archaeologists have many ways to share the information they have gathered. Through academic journals and conferences, they exchange information with professional colleagues. Through books, magazine articles, educational television programs, films, and the Internet, archaeologists can reach large audiences. Displays and exhibits in museums, historical parks, and visitor centers at archaeological sites encourage the public to view artifacts and learn about the sites where the items were found.

Archaeologists may visit schools and give public lectures. As teachers in colleges and universities, they can expand the methods used to study the past and can train new generations of archaeologists.

How to Learn More

Archaeologists are dedicated to sharing information. That's good news for you, because it means you should have no trouble finding experts who are willing to help you learn more about the field.

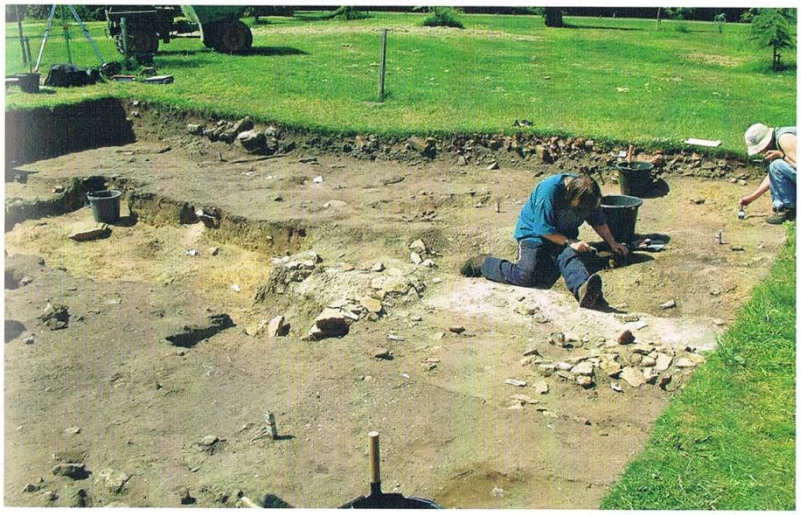
Begin by joining the archaeology club at school, if there is one. Archaeology clubs have sprung up in many junior and senior high schools across the nation. The clubs generally have ties to local colleges, universities, and museums. If there isn't an archaeology club in your school, maybe you could organize one.

Or, attend the meetings of a local history or archaeology society. Each of the 50 states has at least one archaeological society. (See the resources section of this pamphlet or ask your merit badge counselor to help you contact your local society.) The state organization or its local chapters will probably sponsor lectures by archaeologists, tours of nearby sites, or exhibits of archaeological materials from the area.

If possible, visit a large university that has an active program in archaeology and operates its own field project. Ask to see how archaeologists work in the laboratory, study and catalog artifacts, make site maps, and prepare reports on their excavations.

Visit a local museum that displays archaeological artifacts from your area. Ask if there are museum school classes that teach interested amateurs the techniques of excavating, preserving, or displaying artifacts.

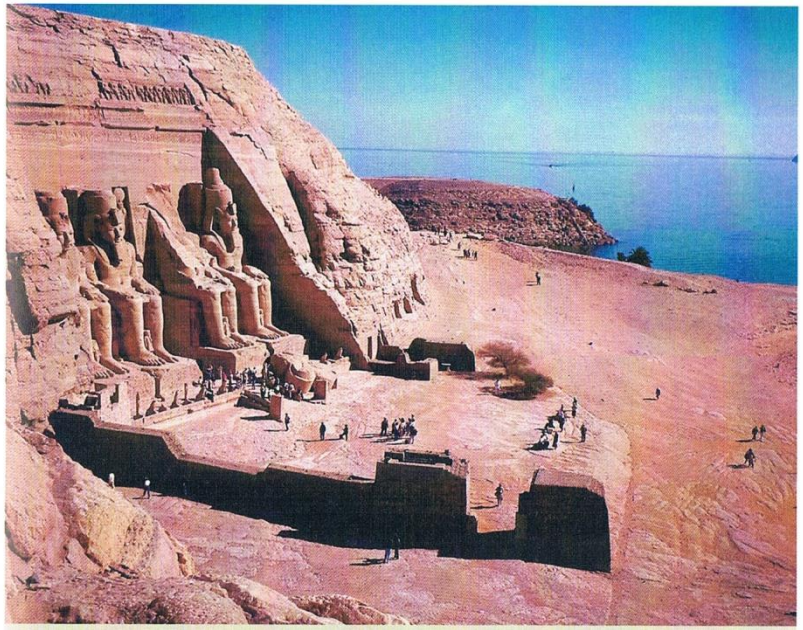
Visit archaeological sites or excavations. About 400 archaeological sites or museums in the United States and Canada are listed in the books *America's Ancient Treasures* by Franklin and Mary Elting Folsom, and *Exploring Ancient Native America: An Archaeological Guide* by David Hurst Thomas. (See the resources section for more information on these and other books.)



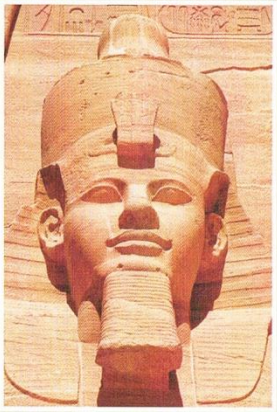
Get your entire Scout troop involved. Invite an archaeologist to speak to your troop or other group. You might invite your state historic preservation officer or state archaeologist (see the resources section), a speaker from an archaeology or history group that is active in your area, or an archaeologist who works for a private company that does archaeological research or surveys.

Better yet, your troop could arrange an archaeological outing. Perhaps the curator of a local museum or an anthropologist at a nearby college or university could give you a group tour of the facility and talk about its archaeological programs. Or arrange a group visit to a state or national historical park, an archaeological site under the jurisdiction of a land management agency such as the USDA Forest Service or the Bureau of Land Management, or a nearby military base that employs an archaeologist.

Parkin Archeological State Park in Arkansas preserves the site of a Mississippian-period American Indian village that is dated at A.D. 1350 to 1550.



In the 1960s at Abu Simbel in Egypt, the colossal statues of Pharaoh Ramses II and his queen, Nefertari, were moved to higher ground to escape the rise of the Nile River behind the new Aswân High Dam. The sandstone figures were cut into huge blocks, then reassembled about 200 feet above the original site, out of reach of the lake's rising waters. The massive rescue effort was paid for by Egypt, the United States, and dozens of other countries through an international partnership led by the United Nations Educational, Scientific, and Cultural Organization (UNESCO). It was the most spectacular job of preservation ever seen in archaeology.



A mock dig gives hands-on experience when it is not possible to work at an actual site. As part of activities conducted by the Dallas Archeological Society for Archaeology Awareness Week, young people excavated this mock site at Old City Park in Dallas, Texas.

Dig This

You have read about archaeology, what it is, and how the work is done. You've gone to meetings of the local archaeological society, talked with professionals, and visited sites or museums. The next step is to get hands-on experience at a professionally supervised archaeological excavation. In other words, it's time to go on a dig. How do you volunteer?

- Check with your state archaeological society. It may have an annual field school in which you can participate. Many archaeological societies conduct workshops and other events as well as field sessions. The events generally are run by professionals or trained avocational archaeologists and are open to society members and the public.
- Call a museum or university in your area. Archaeologists on the staffs of museums and universities often need volunteers to work in the research projects they direct. Some universities and colleges are opening archaeological field schools to people who aren't enrolled as undergraduate or graduate students.
- Check with your local, county, and state governments. There may be archaeological programs in or near your community that use volunteers. The cities of Annapolis and Baltimore, Maryland, and Alexandria, Virginia, for example, have active programs in volunteer archaeology. So do Fairfax County, Virginia, and Prince George's County, Maryland. To find out if programs exist in your community, contact the local parks department, planning department, historic-preservation office, or museums.
- Subscribe to the *PIT Traveler*, a free newsletter (Passport in Time Clearinghouse, P.O. Box 31315, Tucson, AZ 85751-1315; toll-free telephone 800-281-9176; website http://www.passportintime.com). Passport in Time is a nationwide volunteer archaeology and historic preservation program of the

Everywhere you go, ask about volunteer opportunities. Maybe the laboratory you visited could use a part-time volunteer. Is there an archaeological excavation in progress in your area? Find out if you or your troop could help out.

USDA Forest Service. Volunteers work with professional archaeologists and historians on projects including excavation, restoration, and research. There is no fee to participate.

- Check with local units of other federal agencies, including the Bureau of Land Management, the Bureau of Reclamation, the Army Corps of Engineers, and the National Park Service. In some areas of the country, these federal agencies offer volunteers a chance to participate in archaeological investigations. For example, the San Juan Mountains Association in Durango, Colorado, works with the San Juan National Forest and the Bureau of Land Management in its cultural site stewardship program, which trains volunteers to monitor archaeological sites.
- Look in the magazine *Archaeology*. Each year, the magazine publishes a guide to excavations in the Americas and around the world at which individuals can work. Recent guides have listed dozens of projects in more than half the states in the United States.
- See the *Archaeological Fieldwork Opportunities Bulletin*, published annually by the Archaeological Institute of America, for a listing of field schools and excavation programs that need volunteer help. If your local library doesn't have the bulletin, you can order a copy from the David Brown Book Company (see the resources section).
- With your parent's permission, research the Internet. Look for legitimate groups working with professional archaeologists. Several projects seeking students and volunteers are listed in the resources section at the back of this book.

Some digs require archaeologists to work underwater. For instance, this steamboat wreck is visible from the riverbank only during times of drought; to get the "big picture," archaeologists must look below the water's surface.

- Contact the following organizations, which place volunteers and students into archaeological field projects directed by professionals. Some of these organizations charge for their services, so be sure to ask about costs. Volunteers pay for their own travel, room, and board. They must be prepared to work hard. Because of the amount of training given to volunteers, most professionals will expect volunteers to commit to work for at least one week.

  Center for American Archeology
  Crow Canyon Archaeological Center
  Earthwatch International
  Foundation for Field Research
  Four Corners School of Outdoor Education
  Mississippi Valley Archaeology Center
  University Research Expeditions Program

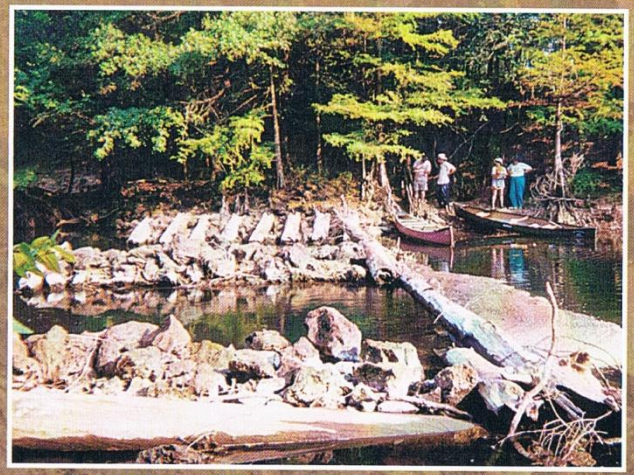
For more information about the resources and opportunities mentioned on these pages, see the resources section at the end of this pamphlet.

Mock Digs

In some areas, it is hard to find an archaeological site at which to volunteer. You might find it necessary to substitute an artificial site—a mock dig—for actual field work. An artificial site can range in size from a clear plastic shoe box to an area that covers a few square yards. To build the site, you must understand the basic ideas presented in this pamphlet. The person or group that excavates the site will record what is found and where it is found, and then attempt to correctly interpret the findings.

Going on a mock dig should be as much like participating in a real dig as possible. The participants should accurately record all the data they uncover as they dig down layer by layer. They should make notes on site location, date of excavation, artifacts found, areas of discolored soil and changes in soil types, different kinds of artifacts, or other clues that show use of the site during different time periods.

Ask an educational specialist at a local museum, a professional archaeologist, a trained avocational (hobbyist) archaeologist, an adviser from a local archaeological society, a science teacher, or other qualified instructor to help you find out how to plan and create a mock dig. Under the supervision of a qualified archaeologist or instructor, prepare the dig and help a group properly excavate the site. Have the excavators keep notes and make maps of what they find. Have them write up their results, then compare their results with your plan for the site.



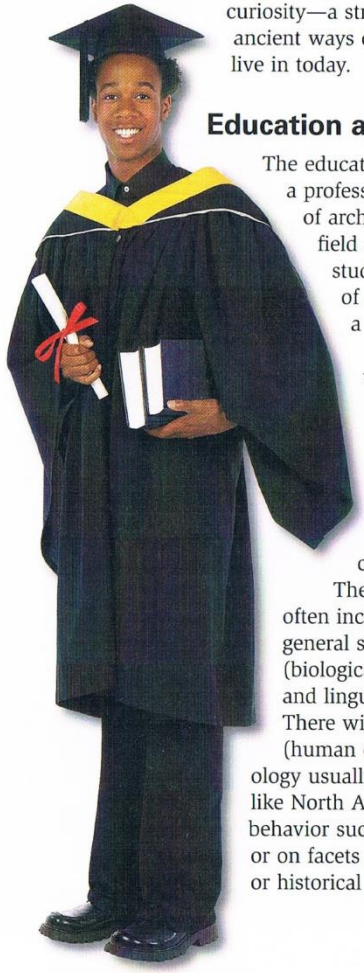
Careers in Archaeology

What does it take to be a professional archaeologist? Three important qualities are curiosity, patience, and the willingness to work hard.

Field work in archaeology is a combination of demanding physical labor and careful scholarship. It takes stamina to excavate a site and patience to accurately record all of the information uncovered in the process of digging. An investigator in the field might wield a pick and shovel one day, then take up a trowel and brushes for the delicate, painstaking work of unearthing and cleaning fragile artifacts. Laboratory work also requires great patience, as archaeologists may spend years analyzing and interpreting their finds.

The temple of Mayan god Kukulcán surmounts El Castillo, a large pyramid at Chichén Itzá in Yucatán, Mexico.

If you ask a dozen professional archaeologists why they chose their career, you'll probably get a dozen different answers. Archaeologists follow their own interests. One reason that many people find this an appealing profession is that it lets them satisfy their curiosity about a vanished culture, a remote area, a period in history, or some intriguing aspect of the human past. One trait that is common to all archaeologists is curiosity—a strong curiosity about the lost cultures and ancient ways of life that helped to shape the world we live in today.



Education and Training Required

The education and training you will need to become a professional archaeologist depend on what kind of archaeology you want to do. To work as a field archaeologist and to do basic laboratory studies, you must have at least a bachelor of arts or a bachelor of science degree with a major in anthropology.

The anthropology departments of universities in the United States usually include archaeology as one of four subdisciplines. The other three are physical anthropology, cultural anthropology, and linguistics. Few universities have separate archaeology departments.

A major in anthropology requires courses in all four of the subdisciplines.

The courses required for the bachelor's degree often include introductory anthropology and broad, general survey courses in physical anthropology (biological variation and adaptation in humans) and linguistics (human speech and language). There will also be courses in cultural anthropology (human cultures and customs). Courses in archaeology usually focus on specific areas of the world like North America or Asia, on types of human behavior such as social organization or religion, or on facets of the field such as nautical, classical, or historical archaeology.

Students of archaeology study a variety of subjects, including many sciences. The scientific analysis of sites and artifacts requires a knowledge of geology, paleontology, physics, chemistry, botany, zoology, and statistics.

Interdisciplinary programs that combine archaeology with various other fields of study are common. Students who wish to study ancient civilizations or historical archaeology, for example, will probably have courses in art, architecture, classics, history, ancient and modern languages, theology, and folklore.

Historical archaeologists usually major in anthropology or history. For students interested in ancient and classical civilizations, it is a good idea to begin learning several ancient and modern languages (for example, Greek, Latin, German, and French).

To work as a field archaeologist, previous experience is often required (usually obtained by spending a summer in an archaeological field school or participating as a volunteer). Archaeological field schools provide the best way to learn how to properly excavate and document archaeological sites, and also to find out if archaeology is the career for you.

You can begin now to prepare for your college coursework by taking all of the science, history, and language classes you can. Strong communication skills are vital to an archaeologist, so you'll need a good grounding in English and speech. Courses in writing, word processing, computer graphics, and desktop publishing will help in producing research papers and field reports, and writing requests for grants.

It's a good idea to keep a scrapbook of newspaper and magazine articles about new discoveries. Many exciting finds are so recent that they don't yet appear in the history books.

Read Widely

Most libraries have many excellent books and magazines about archaeology. The resources section at the end of this pamphlet lists some recommended titles, but the list barely scratches the surface of all that is available. Visit your local library and ask a librarian to help you find information.

Graduate Study

While a bachelor's degree will qualify you to work on an archaeological field crew, it won't allow you to move into a supervisory role. Supervisory positions require a graduate degree.

There are two levels of graduate training in archaeology. The first is a master of arts or master of science degree, which takes about one to two years of coursework beyond the bachelor's degree. Graduate students may take advanced, specialized courses, such as courses in dating techniques or seminars on hieroglyphic writing.

Most master's programs require students to be able to read at least one foreign language. You should choose a language that will be helpful in your future research. If you plan to do research in South America, for example, Spanish would be the logical choice.

Earning a master's degree usually requires the student to prepare a written *thesis* that presents the results of the student's original research. A master's degree with a thesis and a year of field and laboratory experience is the minimum requirement needed for certification by the Register of Professional Archaeologists.

A master's degree would qualify you to direct field crews and is enough for many government jobs in archaeology. It is also sufficient to work for a private company, to teach in a community college, and to work for some museums.

The second graduate degree is the doctoral degree, which is required to teach in a four-year college or university or to work as a curator in a museum. The Ph.D. degree requires two to three years of courses beyond the master's. The student must successfully prepare and defend a *dissertation* that contains original research in the student's chosen area of specialization.

The dissertation is normally a book-length document. Researching and writing a dissertation shows that the student is able to pursue scientific inquiry by choosing a particular problem and solving it logically through field research or laboratory work.

Some graduate programs offer streamlined tracks for students with a bachelor's degree so that they work directly toward a Ph.D. Other programs require a master's degree first.

Most foreign governments will issue excavation permits only to archaeologists with a Ph.D. degree. This means that opportunities to direct field projects outside the United States are limited to professional archaeologists with a doctoral degree.

Nearly a thousand years ago, Leif Eriksson led Viking explorers to the eastern coast of North America. At a Viking settlement site at L'Anseaux-Meadows, Newfoundland, Canada, this Viking-built structure from the year 1000 has been reconstructed.

Areas of Specialization

Most archaeologists end up specializing rather narrowly in a particular area of interest. Some work in historical archaeology. Others study the prehistoric past. Some excel at fieldwork. Others enjoy using computers to test their ideas. While one professional might specialize in ceramic technology or ancient calendar systems, another might become an expert on the cultures of the American Southwest or an authority on 19th century army posts in Montana.

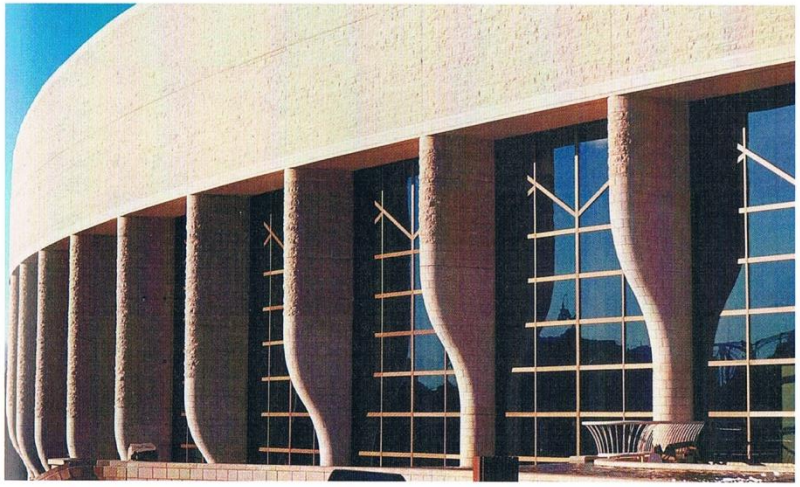
It's too soon for you to think much about choosing a specialty. If you are preparing for a career in archaeology, you will be studying a wide variety of subjects from now until you earn a bachelor's degree. By the time you get to graduate school, you'll have enough experience to know what aspect of archaeology strongly interests you and appeals to you as a specialty.

Where Archaeologists Work

Professional archaeologists work for universities, colleges, museums, the federal government, and state governments; in private companies; and as consultants. They teach, conduct field investigations, analyze artifacts and sites, and publish the results of their research.

Academic Positions. Faculty members at colleges and universities not only teach but also do research, including fieldwork, and publish the results. Most faculty positions are nine-month appointments. During the summer, academic archaeologists conduct field research, teach summer school, teach summer field schools, or work as private consultants. They may get the funds to do their research from their school, from federal agencies such as the National Science Foundation and the National Endowment for the Humanities, and from private foundations such as the National Geographic Society, Earthwatch, and others. Within colleges and universities, archaeologists are found in the departments of anthropology, art history, architecture, classics, history, and theology.

Museum Positions. Museum curators conduct research, publish the results, give public presentations, prepare displays, and conserve the collections of the museum. Museum positions require a graduate degree.



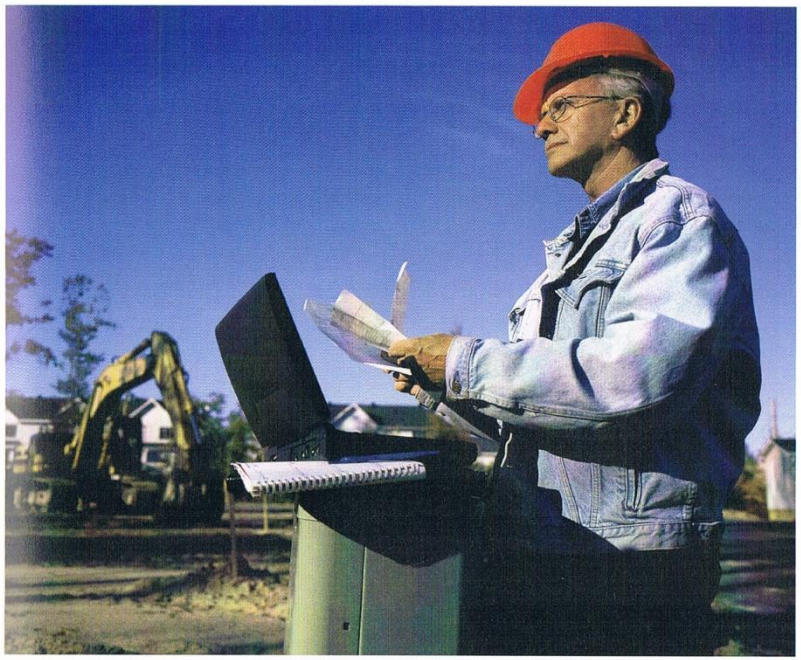
State and Federal Government Positions. Federal and state laws that protect the environment include protection for important archaeological sites. As a result, the government is involved in managing archaeological sites on federal and state lands such as parks and forests.

Not surprisingly, therefore, the federal government employs many archaeologists. The USDA Forest Service, National Park Service, Bureau of Land Management, and the U.S. Army Corps of Engineers all have archaeologists. Most government positions require a master's degree.

Many archaeologists also work for state government agencies. Every state has a state historic preservation office with one or more archaeologists on staff. In addition, archaeologists work in state parks departments, highway departments, and water resource departments. Some cities also hire archaeologists to be responsible for local archaeological sites.

Construction projects often require archaeological surveys to locate prehistoric or historic sites. If sites are found, decisions must be made about excavating some or all of the sites before construction begins. Federal and state archaeologists are involved in making those decisions and supervising the archaeologists who do the work. This kind of archaeology is called *cultural resources management (CRM)*.

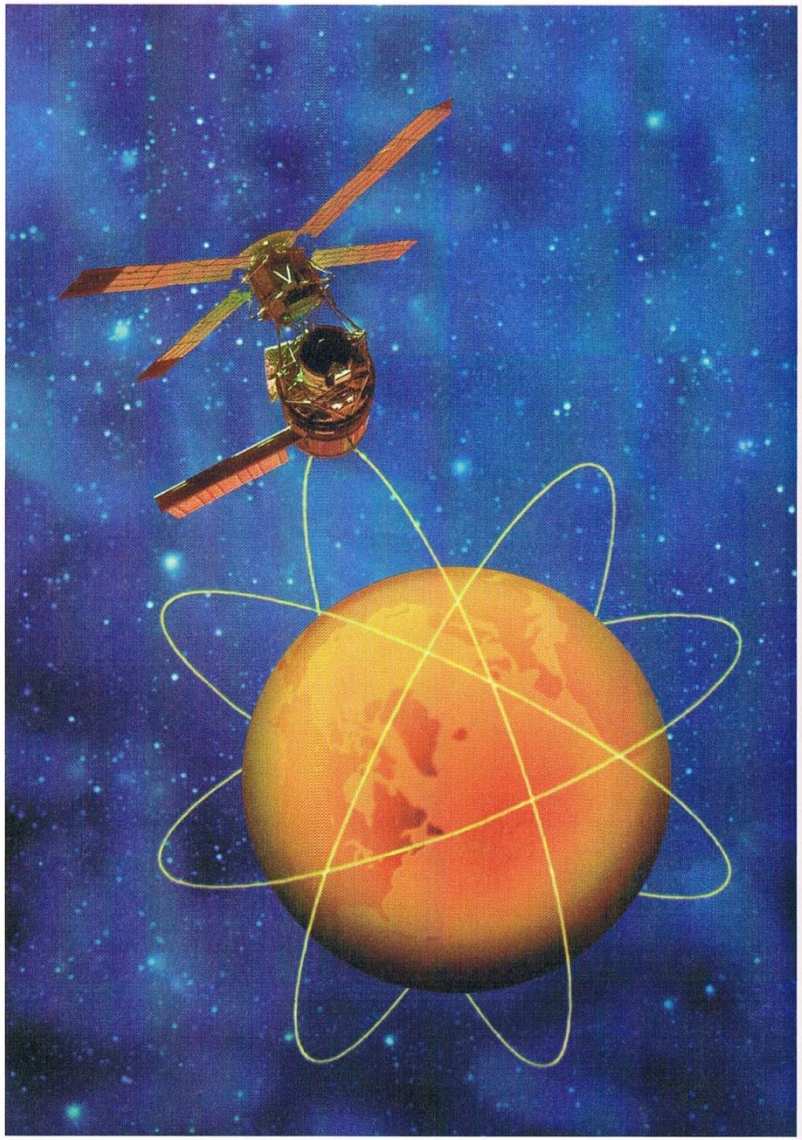
Among the Mayan ruins at Uxmal, Yucatán, Mexico, is the Pyramid of the Magician.



Private Sector Archaeologists. Archaeologists also work for firms that direct the CRM investigations required by law. They conduct archaeological surveys and excavate significant sites before those sites are destroyed by construction activities.

Private sector archaeologists work in the field, in the laboratory analyzing the results of their field investigations, and in the office writing reports on those investigations and preparing proposals to conduct additional work. They may work for laboratories or centers within colleges and universities, for engineering and environmental companies, for companies specializing in archaeological investigations, or as private consultants. These organizations also hire field archaeologists as temporary staff to assist with field investigations.

Field positions usually require a bachelor's degree and previous experience in an archaeological field school. Supervisory positions in cultural resources management work require a master's degree.



Archaeology in the Future

Years from now, archaeologists of the future will examine sites and artifacts from our age. What will they find? How will they interpret our cultures? What exciting new tools will they use to peer into the past?

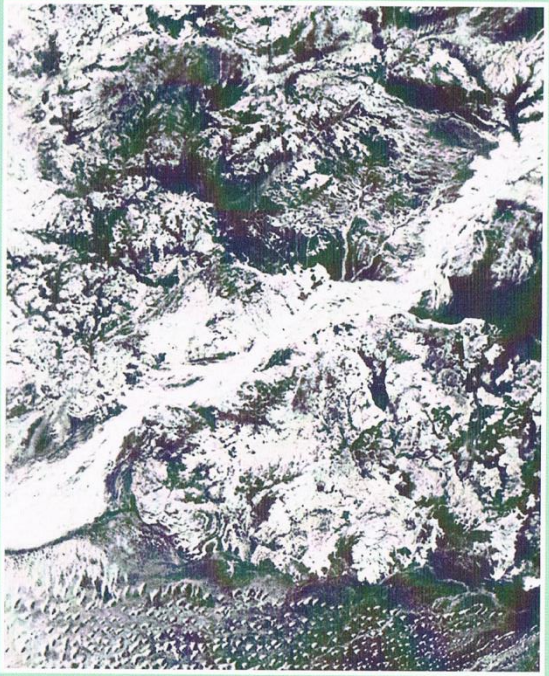
Archaeologists in the future undoubtedly will develop better and more sophisticated techniques for finding and excavating sites, examining and interpreting finds, preserving artifacts, and sharing information. New technology is likely to affect nearly everything people do, archaeology included.

Computers will be used in many ways for mapping, artifact classification, simulations, and analysis. Archaeologists in the future may use deep-sea diving suits and computer-controlled robots to investigate shipwrecks and other underwater remains in ocean depths too cold or too deep for scuba diving.

Faster and more accurate dating methods may be developed. Laser beams may be used to measure distances more accurately. Breakthroughs in genetics, blood chemistry, and other sciences will continue to add to our understanding of the human past.

Much will also be learned as future scientists take another look at the artifacts, samples, field notes, maps, and other records that today's archaeologists take such pains to prepare and preserve. As archaeologists develop better techniques, they will revisit sites that have already been studied and they will learn more. Today's archaeologists are keeping intact some ancient sites and portions of sites for exactly that reason: They expect future generations of archaeologists to have better tools for studying the sites.

Aerial photography and satellites may come to play an even bigger role in locating and investigating sites than they do now. Archaeologists in the future may use photographs taken from aircraft, satellites, and other *remote-sensing* techniques, including radar scans and magnetic detection, to study sites without actually excavating them or collecting artifacts. Scientists call this *nondestructive archaeology.*

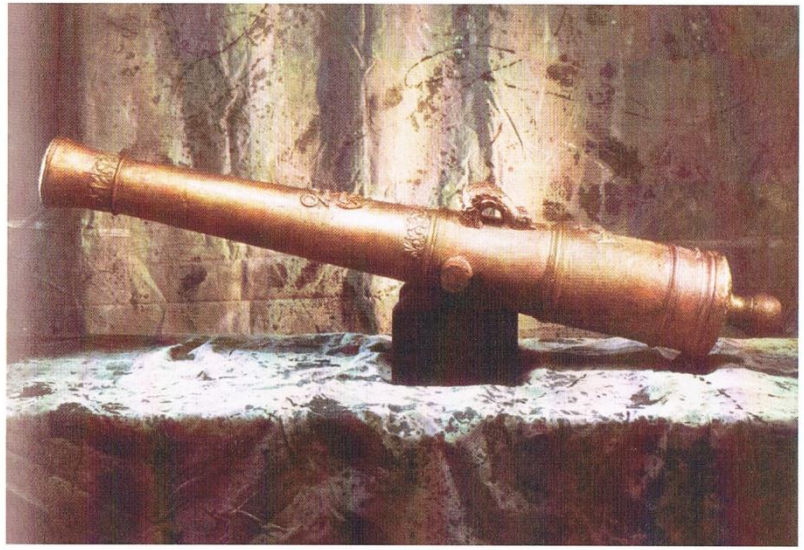


Aerial photographs from satellites may help future archaeologists locate and study sites in remote parts of the world. This is a radar image of the region around the site of the lost city of Ubar in southern Oman, on the Arabian Peninsula. The ancient city was discovered in 1992 with the aid of remote sensing data. This image was taken by a spaceborne radar on board the space shuttle *Endeavour.*

Saving the Past for the Future

Archaeological sites are irreplaceable. A site destroyed by vandalism, modern development, or natural forces is gone forever. It falls to us—the people who are alive today—to take care of these valuable sites so that future researchers can add to the knowledge of the past.

If we fail in our duty, then no new pieces can ever be added to the incomplete picture that we have. What we know now is all that we will ever know, for all of time. That's food for thought, isn't it?



In January 1686, French explorers led by Sieur de La Salle watched in horror as the *Belle,* their last ship, ran aground on a sandbar and was lost. The explorers were stranded on a marshy stretch of the Texas Gulf Coast. They fell victim to disease, deadly snakes, food shortages, and attacks by the Karankawas, the native people of the area. In 1995, more than 300 years later, marine archaeologists found the French ship lying under 12 feet of water, covered by sand and silt. The *Belle* is one of the most historically important shipwrecks to be found in North America. The wreckage yielded many artifacts, including an ornate bronze cannon about 6 feet long and weighing about 700 pounds, bearing a royal crest. The scientific excavation and study of these artifacts will allow archaeologists to reconstruct the lives of 17th century French explorers.

Archaeology Resources

Scouting Literature

North American Indian; American Cultures, American Heritage, Archery, Architecture, Art, Astronomy, Basketry, Chemistry, Genealogy, Geology, Indian Lore, Leatherwork, Metalwork, Pioneering, Pottery, Sculpture, Scouting Heritage, Surveying, Textile, and *Wood Carving* merit badge pamphlets

Visit the Boy Scouts of America's official retail website at http://www.scoutstuff.org for a complete listing of all merit badge pamphlets and other helpful Scouting materials and supplies.

Books

Archaeological Institute of America. *Archaeological Fieldwork Opportunities* Bulletin. David Brown Book Company (P.O. Box 511, Oakville, CT 06779; toll-free telephone 800-791-9354; website http://www.oxbowbooks.com).

Barnes, Trevor. *Archaeology.* Houghton Mifflin, 2004.

Bush, B. Jane. *If Rocks Could Talk.* Dale Seymour, 2001.

Constable, Nick. *The World Atlas of Archaeology.* Globe Pequot Press, 2000.

Deetz, James. *In Small Things Forgotten: An Archaeology of Early American Life.* Knopf, 1996.

Devereux, Paul. *Archaeology: The Study of Our Past.* Gareth Stevens, 2002.

Dubowski, Cathy East, and Mark Dubowski. *Ice Mummy: The Discovery of a 5,000-Year-Old Man.* Random House, 1998.

Fagan, Brian M. *Archaeologists: Explorers of the Human Past.* Oxford University Press, 2003.

———. *The Great Journey: The Peopling of Ancient America.* University Press of Florida, 2004.

———. *Time Detectives: How Archaeologists Use Technology to Recapture the Past.* Simon & Schuster, 1996.

Folsom, Franklin, and Mary Elting Folsom. *America's Ancient Treasures.* University of New Mexico Press, 1993.

Giblin, James Cross. *Secrets of the Sphinx.* Scholastic, 2004.

Greenberg, Lorna, and Margot F. Horwitz. *Digging Into the Past: Pioneers of Archeology.* Scholastic, 2001.

Greene, Meg. *Buttons, Bones and the Organ Grinder's Monkey: Tales of Historical Archaeology.* Shoe String Press, 2001.

Hansen, Joyce, and Gary McGowan. *Breaking Ground, Breaking Silence: The Story of New York's African Burial Ground.* Henry Holt, 1997.

Harrison, Peter D. *The Lords of Tikal: Rulers of an Ancient Maya City.* Thames & Hudson, 2000.

Hawass, Zahi. *Curse of the Pharaohs: My Adventures With Mummies.* National Geographic Society, 2004.

James, Simon. *Eyewitness: Ancient Rome.* DK Publishing, 2004.

Laubenstein, Karen J. *Archaeology Smart Junior: Discovering History's Buried Treasures.* Random House, 1997.

Lauber, Patricia. *Who Came First? New Clues to Prehistoric Americans.* National Geographic Society, 2003.

Lerner Geography Department. *Sunk! Exploring Underwater Archaeology.* Lerner, 1994.

Lister, Robert H., and Florence C. Lister. *Those Who Came Before: Southwestern Archeology in the National Park System.* Western National Parks Association, 1994.

Lourie, Peter. *Lost World of the Anasazi: Exploring the Mysteries of Chaco Canyon.* Boyds Mills Press, 2004.

McIntosh, Jane R. *Eyewitness: Archeology.* DK Publishing, 2000.

———. *The Practical Archaeologist: How We Know What We Know About the Past.* Facts on File, 1999.

Putnam, James. *Eyewitness: Pyramid.* DK Publishing, 2004.

Rathje, William L., and Cullen Murphy. *Rubbish! The Archaeology of Garbage.* University of Arizona Press, 2001.

Samford, Patricia, and David L. Ribblett. *Archaeology for Young Explorers: Uncovering History at Colonial Williamsburg.* Colonial Williamsburg Foundation, 1995.

Sharer, Robert J., and Wendy Ashmore. *Archaeology: Discovering Our Past.* McGraw-Hill, 2002.

Smith, K. C. *Exploring for Shipwrecks.* Scholastic, 2000.

Thomas, David Hurst. *Archaeology: Down to Earth.* Wadsworth, 1998.

———. *Exploring Ancient Native America: An Archaeological Guide.* Routledge, 1999.

Wheatley, Abigail, and Struan Reid. *Archaeology.* Usborne Books, 2005.

Yeager, C. G. *Arrowheads and Stone Artifacts: A Practical Guide for the Amateur Archaeologist.* Pruett Publishing, 2000.

Multimedia

Abler, Wayne. *Mounds of the Upper Mississippi Valley.* VHS video. Mississippi Valley Archaeology Center, 1997.

The Archaeological Detective. CD-ROM. Micro-Intel Inc., 1997.

Archaeology: Revealing Our History. VHS video. Colonial Williamsburg Foundation, 2002.

Bullock, Tom, and Andy Burnham. *Stone Circles . . . and Stone Rows: Photographic Tours.* CD-ROM. Megalithic.co.uk, 2004.

Davis Jr., R. P. Stephen; Patrick C. Livingood; H. Trawick Ward; and Vincas P. Steponaitis, editors. *Excavating Occaneechi Town: Archaeology of an Eighteenth-Century Indian Village in North Carolina.* CD-ROM and booklet. University of North Carolina Press, 1998.

Fox Jr., Richard A. *Archaeology, History, and Custer's Last Battle.* VHS video. University of Oklahoma Press, 1995.

Scientific American. Exploring Ancient Cities. CD-ROM. W H Freeman, 1994.

Sept, Jeanne M. *Investigating Olduvai: Archaeology of Human Origins.* CD-ROM. Indiana University Press, 1997.

Organizations and Websites

American Anthropological Association
Archaeology Division, Suite 600
2200 Wilson Blvd.
Arlington, VA 22201
Telephone: 703-528-1902
Website: http://www.aaanet.org

Archaeological Conservancy
5301 Central Ave. NE, Suite 1218
Albuquerque, NM 87108-1517
Telephone: 505-266-1540
Website:
http://www.americanarchaeology.com

Archaeological Institute of America
Boston University
656 Beacon St., Fourth Floor
Boston, MA 02215-2006
Telephone: 617-353-9361
Website: http://www.archaeological.org

Center for American Archeology
P.O. Box 366
Kampsville, IL 62053
Telephone: 618-653-4316
Website: http://www.caa-archeology.org

Center for the Study of the First Americans
Department of Anthropology
Texas A&M University
College Station, TX 77543-4352
Telephone: 979-845-4046
Website:
http://www.centerfirstamericans.com

Crow Canyon Archaeological Center
23390 Road K
Cortez, CO 81321
Telephone: 800-422-8975
Website: http://www.crowcanyon.org

Earthwatch Institute
Three Clock Tower Place, Suite 100
Box 75
Maynard, MA 01754
Toll-free telephone: 800-776-0188
Website: http://www.earthwatch.org

Elden Pueblo Archaeological Project
P.O. Box 3496
Flagstaff, AZ 86003
Telephone: 928-527-3452

Foundation for Field Research
P.O. Box 2010
Alpine, CA 92001
Telephone: 619-450-3460 or 619-445-9264

Four Corners School of Outdoor Education
P.O. Box 1029
Monticello, UT 84535
Telephone: 800-525-4456
Website:
http://www.fourcornersschool.org

Mississippi Valley Archaeology Center
University of Wisconsin—La Crosse
1725 State St.
La Crosse, WI 54601
Telephone: 608-785-8463
Website: http://www.uwlax.edu/mvac

National Association of State Archaeologists
Website:
http://www.uiowa.edu/~osa/nasa

National Conference of State Historic Preservation Officers
Suite 342 Hall of the States
444 N. Capitol St., NW
Washington, DC 20001-7572
Telephone: 202-624-5465
Website: http://www.ncshpo.org

National Park Service
1849 C St., NW
Washington, DC 20240
Telephone: 202-208-6843
Website: http://www.cr.nps.gov

Society for American Archaeology
900 Second St., NE, No. 12
Washington, DC 20002-3557
Telephone: 202-789-8200
Website: http://www.saa.org

Society for Historical Archaeology
15245 Shady Grove Road, Suite 130
Rockville, MD 20850
Telephone: 301-990-2454
Website: http://www.sha.org

Southwestern Archaeology
P.O. Box 61203
Phoenix, AZ 85082-1203
Telephone: 602-697-5754
Website: http://www.swanet.org/

University Research Expeditions Program
UC Davis Extension
1333 Research Park Drive
Davis, CA 95616-4852
Telephone: 530-752-8811
Website:
http://www.extension.ucdavis.edu

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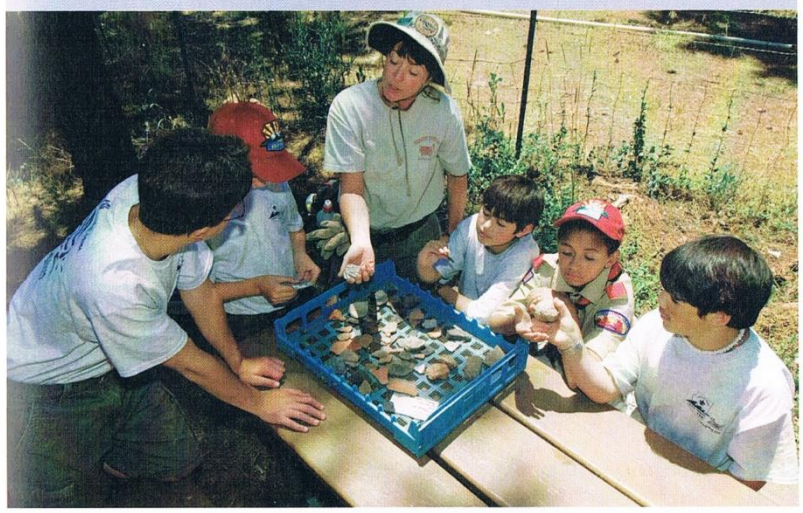
The Elden Pueblo Archaeological Project provides educational opportunities for young people who are interested in archaeology, under professional supervision. The Elden Pueblo site comprises more than 60 rooms of the prehistoric Sinagua culture and a Hopi ancestral site. The Project, which is a "cooperative endeavor between the Coconino National Forest, and Arizona Natural History Association, and the Arizona Archaeological Society," invites visitors to "join us in our quest to learn about past and present Pueblo cultures by investigating the clues people left behind." For more information, visit the Project's website (with your parent's permission) at http://www.fs.fed.us/r3/coconino/recreation/peaks/elden-pueblo.shtml. You may also write or call: Elden Pueblo Archaeological Project, P.O. Box 3496, Flagstaff, AZ 86003-3496; telephone 928-527-3452.



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American Labor	2006	Family Life	2005	Plumbing	2004
Animal Science	2006	Farm Mechanics	2008	Pottery	2008
Archaeology	2006	Fingerprinting	2003	Public Health	2005
Archery	2004	Fire Safety	2004	Public Speaking	2002
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Art	2006	Fish and Wildlife Management	2004	Radio	2008
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