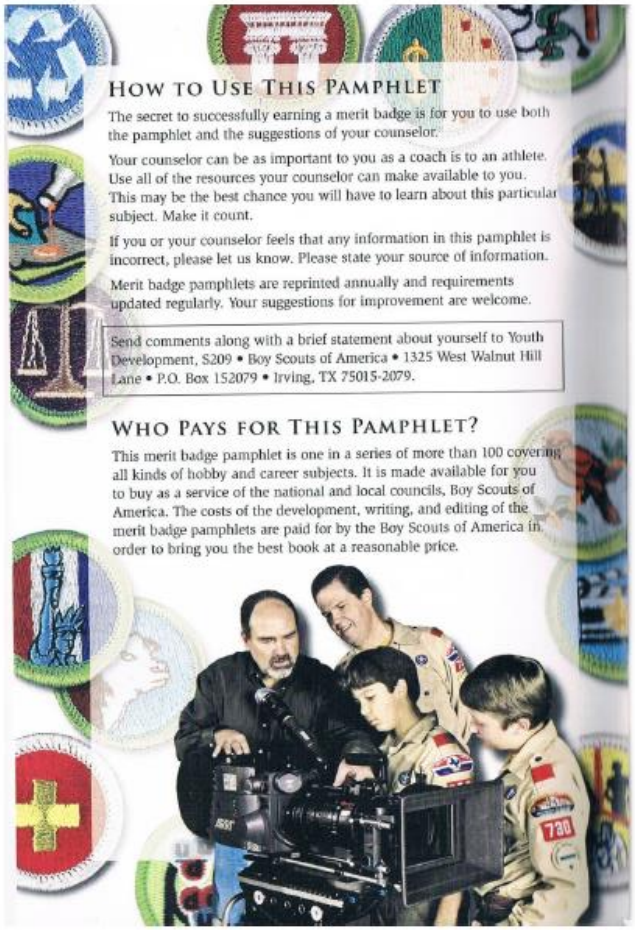
MERIT BADGE SERIES

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.
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.

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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.

Contents

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.

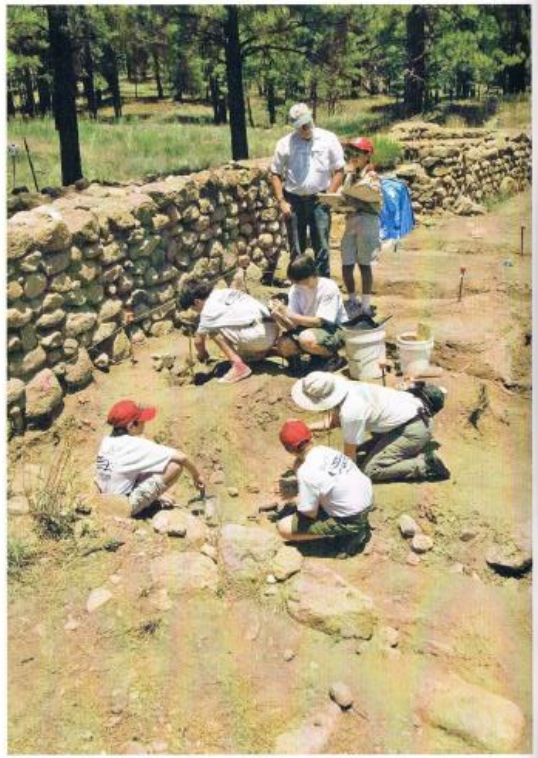
The boy might have been taught how to hunt with spears or bow and arrows, or how to plant grains and store the harvest for winter. He might have learned to heal sicknesses by using medicines from plants. He may have sung the songs that kept alive the stories of his people from one generation to the next.

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.

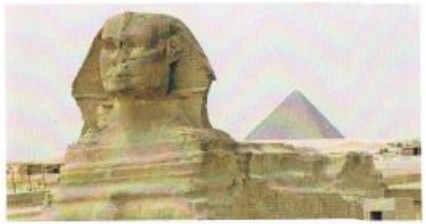
What Archaeologists Study

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.



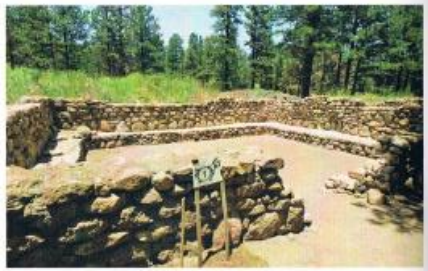
The Great Sphinx at Giza in Egypt, with a pyramid in the background

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

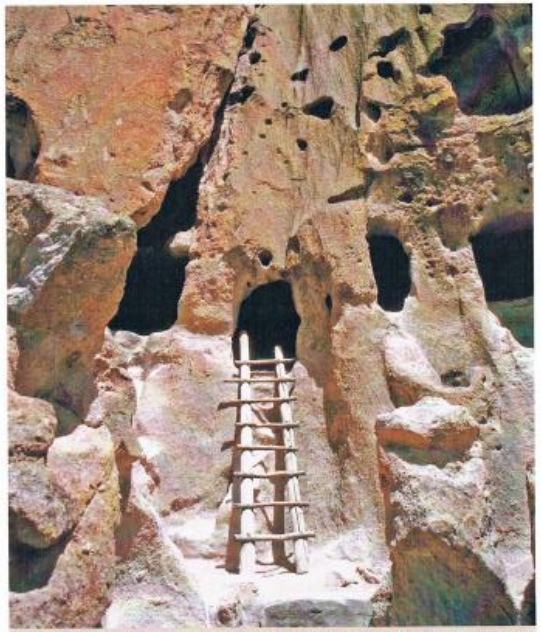
Archaeological artifacts are any items that have been made, used, or changed by people. Examples include stone tools, arrowheads, pottery, utensils, coins, bottles, and jewelry.

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.



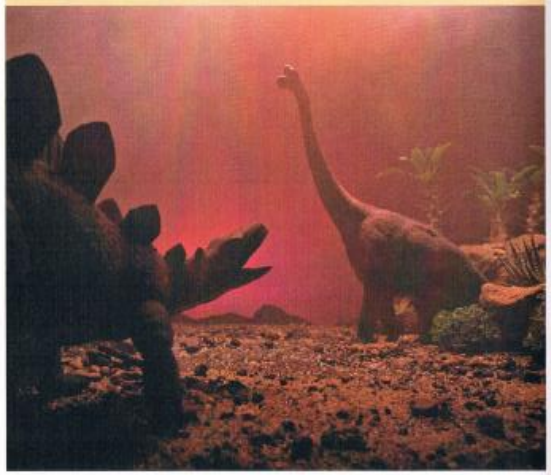
The study of artifacts and the sites where they are found can reveal much about the everyday activities of the past. We can learn where people lived, how they got their food, and what they wore. Archaeological findings may also explain some of the important events in the lives of people long dead—a war 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.



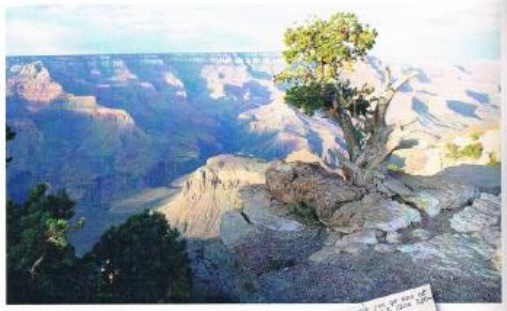
To help you keep these "ologies" straight, here's a simple list:

- 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.

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

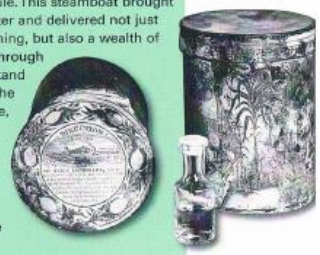
Historians study the relatively recent past as it is revealed through written records.

The Steamboat *Bertrand*: Lost and Found

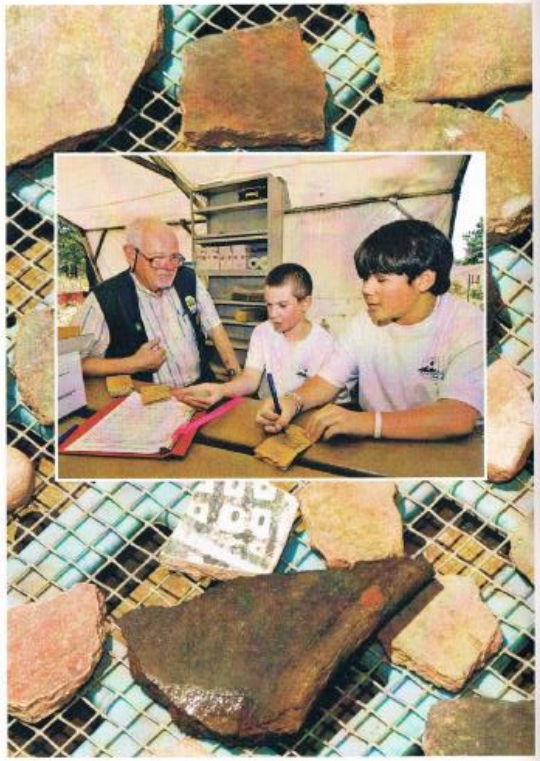
In 1865, a big steamboat called the *Bertrand* was making its way up the Missouri River, carrying a full cargo of supplies destined for miners and settlers upriver in Montana. Just north of Omaha, Nebraska, at a turn in the river called DeSoto Bend, the *Bertrand* hit a submerged log and sank into the 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.

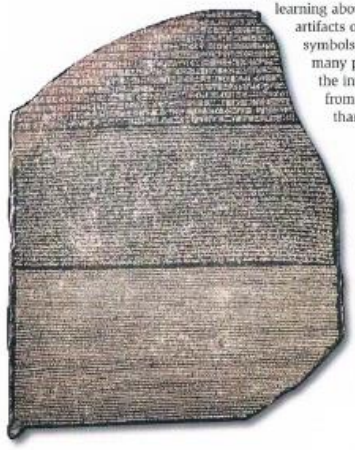
Special techniques were needed to uncover and preserve the waterlogged wooden remains at Ozette. The excavators built a complicated pumping system that sprayed jets of water of different strengths—from blasts powerful enough to remove dense mud from house planks, to a gentle trickle used for washing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

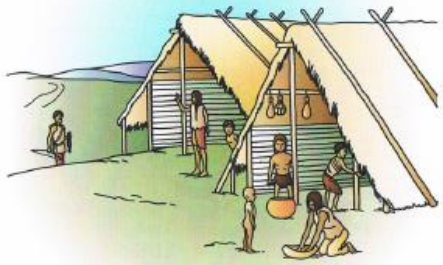
Site Excavation

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.

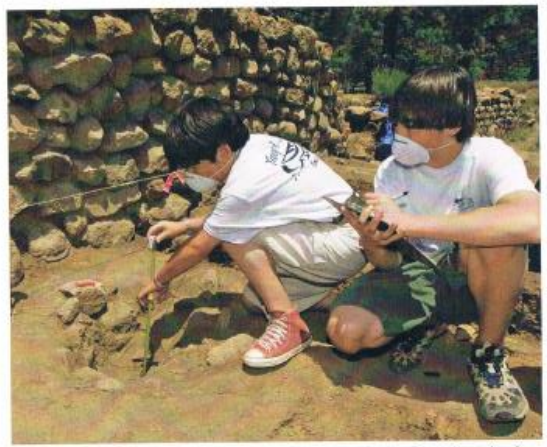
Plant remains were uncovered at this 3,800-year-old site along the Iowa River in Coralville, Iowa.



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.

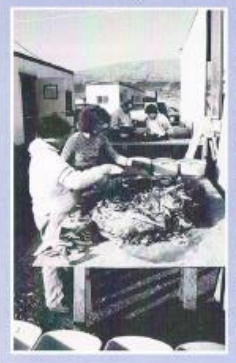
Once it has been moved from the spot where it was found, an artifact can never be returned to exactly the same place. Excavation destroys a site, so data must be recorded before an artifact and its surroundings are disturbed. The records that archaeologists make include site maps, photographs of features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

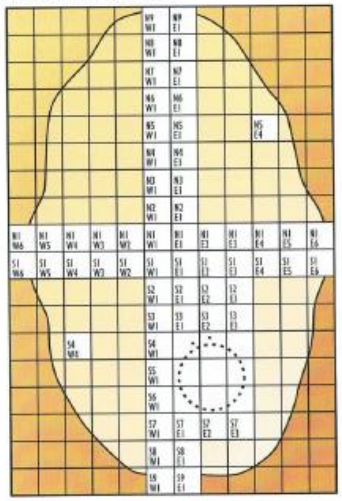
Techniques of Excavation

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

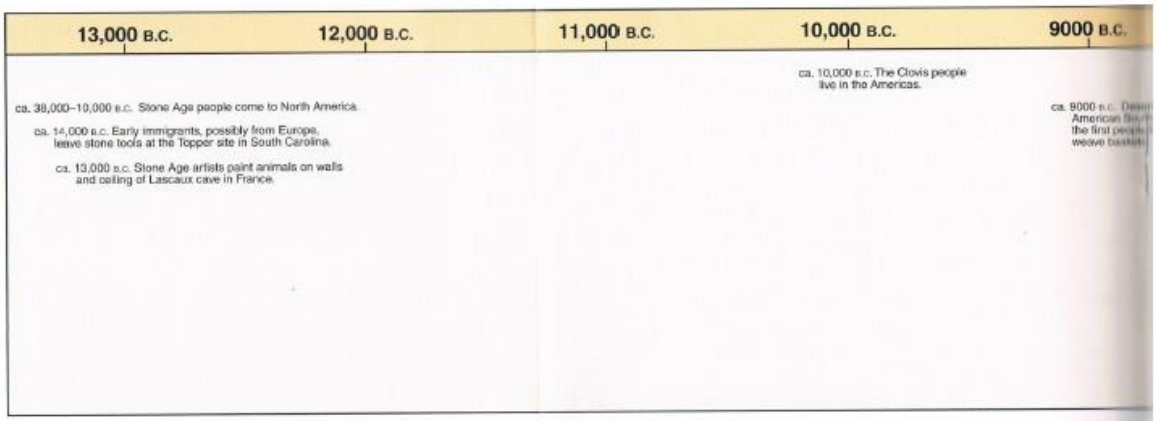
Two important principles in archaeology are *association* and *superposition*.

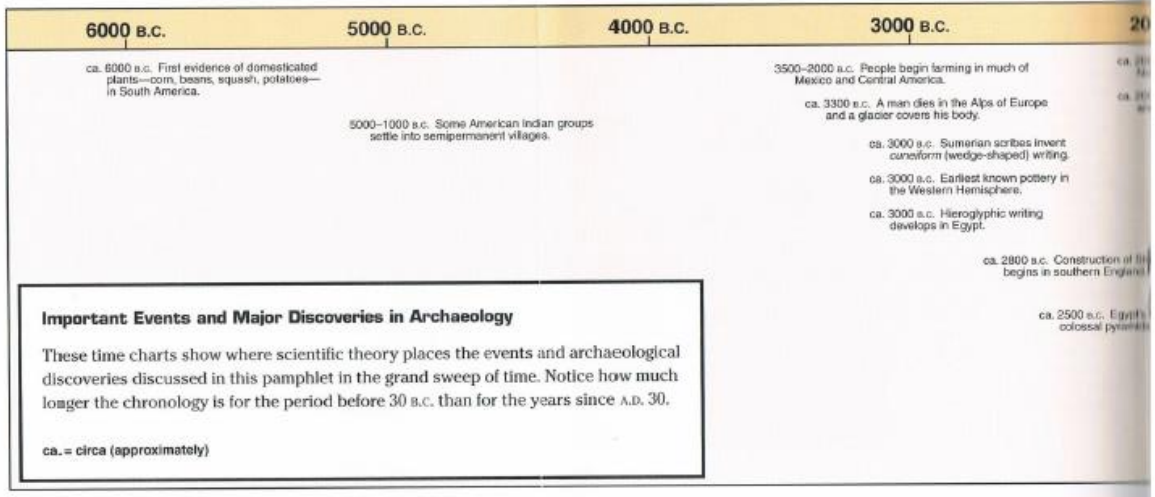
The *principle of association* says that artifacts found together were probably used together and are probably about the same age. An archaeologist who discovers a stone tool buried next to a piece of pottery can make a good guess that the tool and the pottery are about the same age and that people probably 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.





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)