

	9000 B.C.	8000 B.C.	7000 B.C.
	ca. 9000 a.c. Desert dwellers of the American Southwest are among the first people in the world to weave baskets.	ca. 8000 a.c. Hunter-gatherers in Europe begin to build shelters, live in settlements, bury their dead. ca. 8000 a.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 a.c. Jericho in Jordan is world's oldest known walled city.	ca. 7300 a.c. Kennewick Man dies on the banks of the Columbia River in southeastern Washington.
		ca. 8900–8200 a.c. Folsom people live in what is now New Mexico.	

	2000 B.C.	1000 B.C.
ch of	ca. 2000 a.c. Earliest known pottery in North America.	ca. 1020 a.c. The Israelites unite under King Saul.
Europe	ca. 2000 a.c. Bronze Age begins in Europe and the Nile Valley.	ca. 1000 a.c. The Adena people of the Ohio Valley in North America begin to build mounds over the graves of their leaders.
ribes invent ped) writing.		ca. 950 a.c. The Temple of Solomon is built in Jerusalem.
in pottery in re.		776 a.c. The Greeks host the first Olympic Games.
writing		753 a.c. Rome is founded.
800 a.c. Construction of Stonehenge egins in southern England	1351 a.c. Tutankhamun ascends Egypt's throne.	597 a.c. Chaldeans conquer Jerusalem. ca. 563 a.c. Buddha is born. ca. 500 a.c. Confucius teaches in China.
ca. 2500 a.c. Egypt's rulers build colossal pyramids at Giza.	ca. 1270 a.c. Temples of Pharaoh Ramses II and Queen Nefertari built at Abu Simbel. ca. 1200 a.c. The Olmec begin to develop Mexico's first known civilization.	432 a.c. The Parthenon is completed in Athens. 400 a.c.–a.d. 500 Hopewell Indians bury their dead in earthen mounds in the Ohio Valley. 335–327 a.c. Alexander the Great conquers Egypt and Persia. 221–210 a.c. China's first emperor, Qin Shi Huangdi, builds the Great Wall. 30 a.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 Vázquez de Coronado finds Zuni 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 <i>Belle</i> 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 <i>Belle</i> . 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,

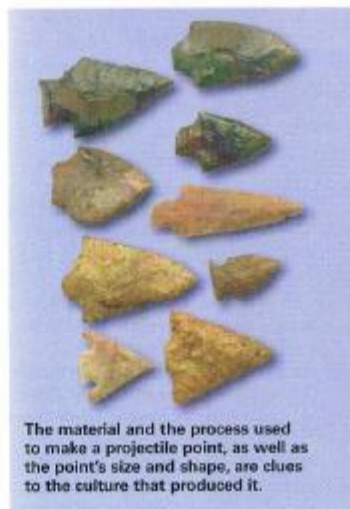
and what it was used for, among other things. New finds are compared with already identified materials. A site may yield hundreds or thousands of artifacts—far too many for each item to be compared individually with every other item found. Therefore, archaeologists classify or categorize artifacts, grouping 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.

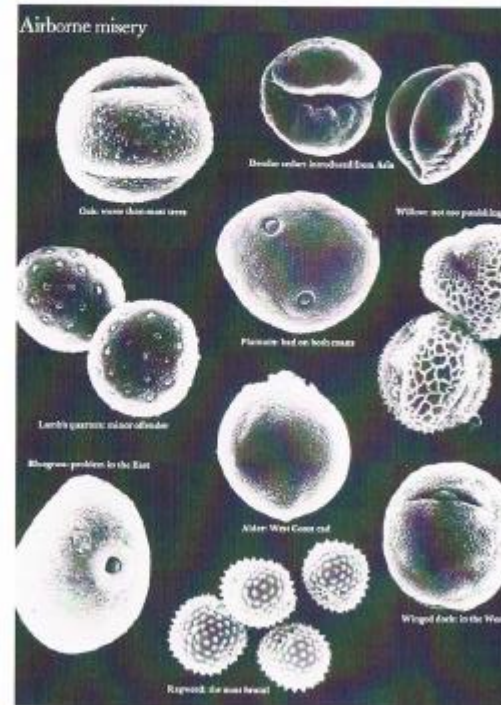
Less common than stone tools or clay pots are perishable artifacts made of wood, plant fibers, animal sinew, and other *organic* materials (materials that were once living). These objects excite particular interest because they are so rare. Dry caves occasionally yield well-preserved baskets, bits of 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.

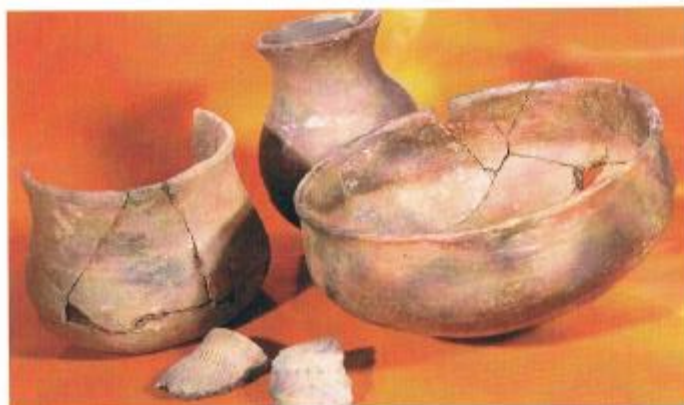
Pollen Analysis

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.

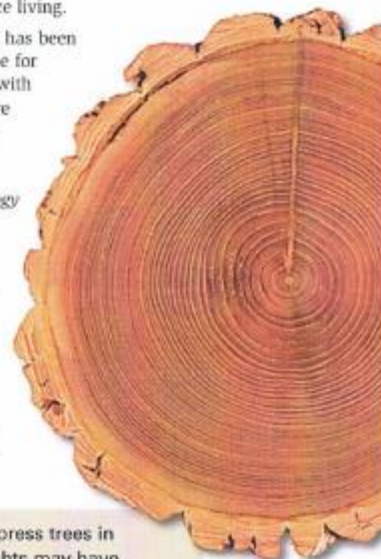
These ways of estimating the ages of artifacts are called *relative* dating techniques because the date of one artifact or site is related to the date of another artifact or site. Powerful scientific tools exist for more accurate dating—that is, for assigning an estimated age to an artifact or a site.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

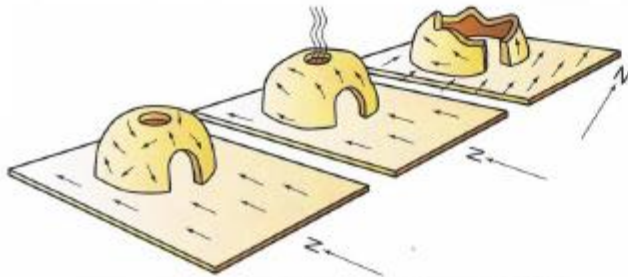
In 1949, scientists discovered a way to use the rate of carbon 14 decay to estimate the age of artifacts that contain carbon. Today, radiocarbon dating is one of the most popular methods for estimating the age of wood, ashes, bones, plant remains, and other items that were once living.

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.

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.

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



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

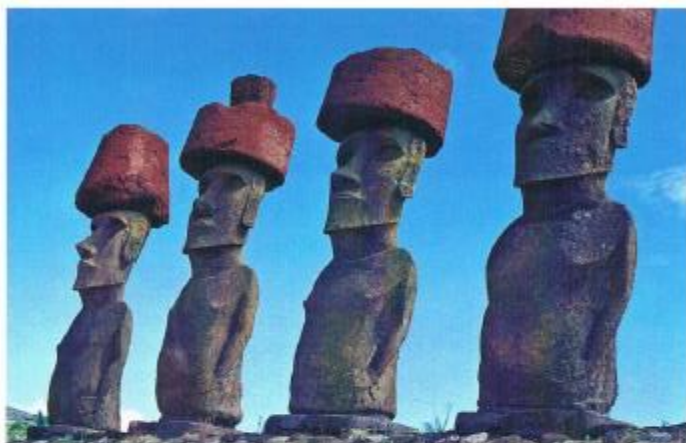
A Scout Troop's Archaeological Good Turn

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.



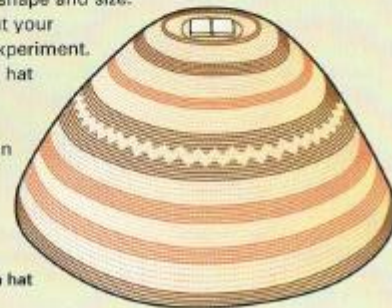
To show that South American Indians could have migrated to Pacific islands, in 1947 Thor Heyerdahl and a small crew sailed the *Kon-Tiki* from Peru to the islands of Polynesia. The *Kon-Tiki*, made of balsa, was modeled after rafts used by Peruvians in ancient times.

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.

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.

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.



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.)

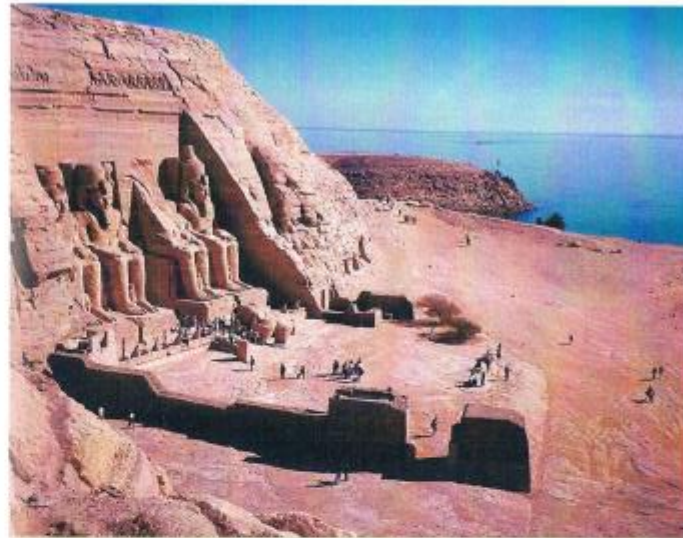


Get your entire Scout troop involved. Invite an archaeologist to speak to your troop or other group. You might invite your state historic preservation officer or state archaeologist (see the resources section), a speaker from an archaeology or history group that is active in your area, or an archaeologist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

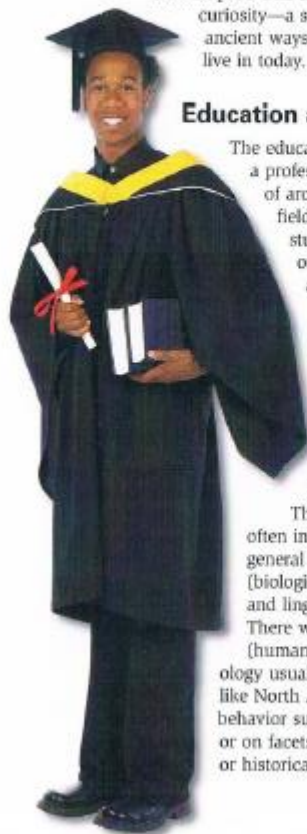
Field work in archaeology is a combination of demanding physical labor and careful scholarship. It takes stamina to excavate a site and patience to accurately record all of the information uncovered in the process of digging. An investigator in the field might wield a pick and shovel one day, then take 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.



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.

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.



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.

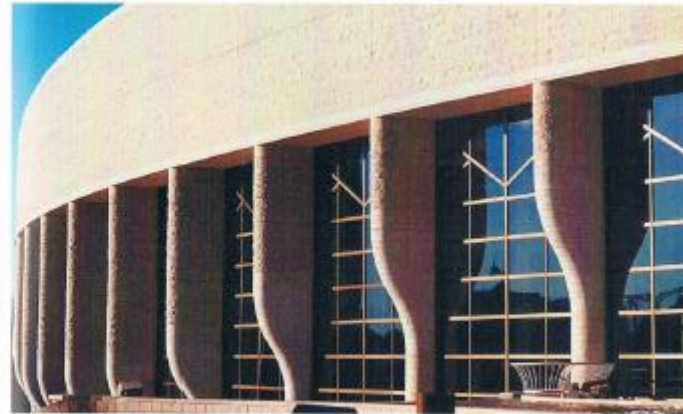
It's too soon for you to think much about choosing a specialty. If you are preparing for a career in archaeology, you will be studying a wide variety of subjects from now until you earn a bachelor's degree. By the time you get to graduate school, you'll have enough experience to know what aspect of archaeology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



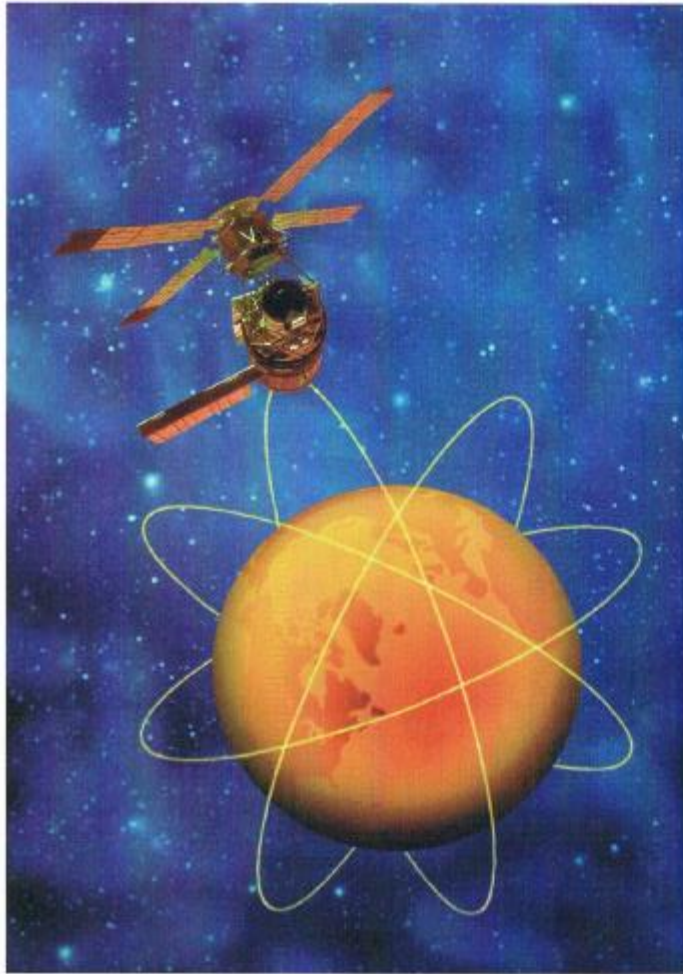
Among the Mayan ruins at Uxmal, Yucatán, Mexico, is the Pyramid of the Magician.



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>).
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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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Thanks to Southern Research Historic Preservation Consultants Inc., Ellerslie, Georgia, for providing technical expertise and support with photographs. In particular, we appreciate Debra J. Wells for her assistance. The company takes on all types of archaeology-based projects from historic preservation and protection of cultural resources to the study and preservation of underwater archaeological sites.

We appreciate the Quicklist Consulting Committee of the Association for Library Service to Children, a division of the American Library Association, for its assistance with updating the resources section of this merit badge pamphlet.

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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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