MERIT BADGE SERIES

ARCHAEOLOGY

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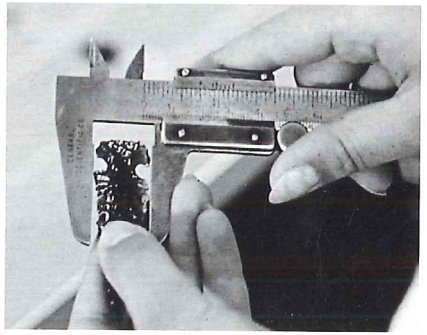
How Archaeology Happens

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, development of a research design, historical research, 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.

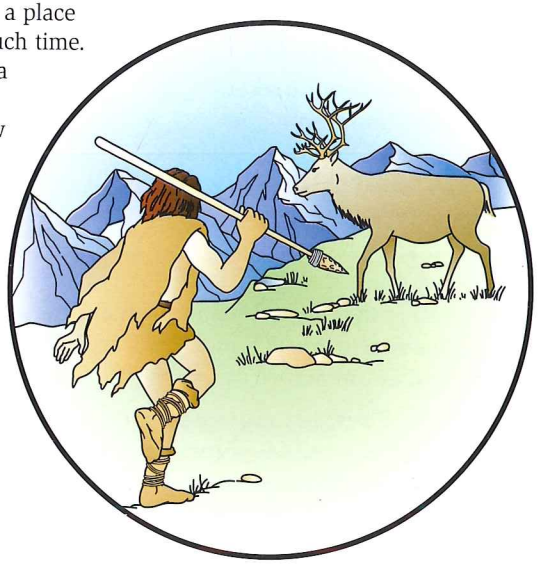
When they have discovered a site, archaeologists thoroughly examine the area before disturbing it. They walk all over the site and look for artifacts and surface features to help them understand what might be found there, as well as how old the site or objects might be. They may dig test pits to get 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 trade practices or distances traveled to quarries.
- 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.

Research Design

Like most sciences, archaeology requires the use of the scientific method to extract as much data as efficiently as possible. How can archaeologists find answers to the past if they don't know what questions to ask? To do this, they develop research questions about the site they will investigate.

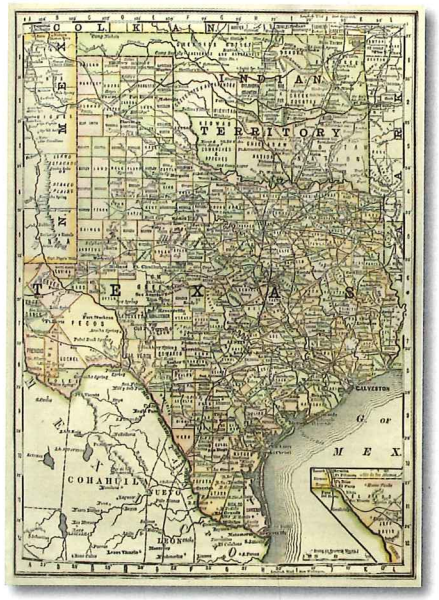
Some examples are: How did the development of the oxbow lake affect American Indian hunting and transportation over time? Were women and children working at the textile mills during the Industrial Revolution healthier than those on farms? Did allied French and American soldiers suffer the same hardships in camp before a 1779 battle in the American Revolution?

Research questions enable archaeologists to determine what areas of the site to study, decide what artifacts can provide crucial answers, and select what research to conduct. The research design also enables archaeologists to make a hypothesis that can be tested, such as: American troops were better supplied than French troops. Archaeologists can test this hypothesis by excavating the French and American camps. If the American camps contain more animal bones, more nutritious cuts of meat, more dishes, and weapons in good condition, then the hypothesis was proved.

Historical Research

Prior to any excavation, archaeologists conduct historical research about the site. Some of this research includes examining old and new maps and aerial photographs to see how landforms have changed over time. A river might form an oxbow lake, or a mountain may have been mined flat, for example.

Archaeologists look at old files and manuscripts to determine if parts of the site were excavated in the past. They may also study old deeds, newspapers, diaries, letters, photographs, and other documents that have information about the people who used the site and how they used it.



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.

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

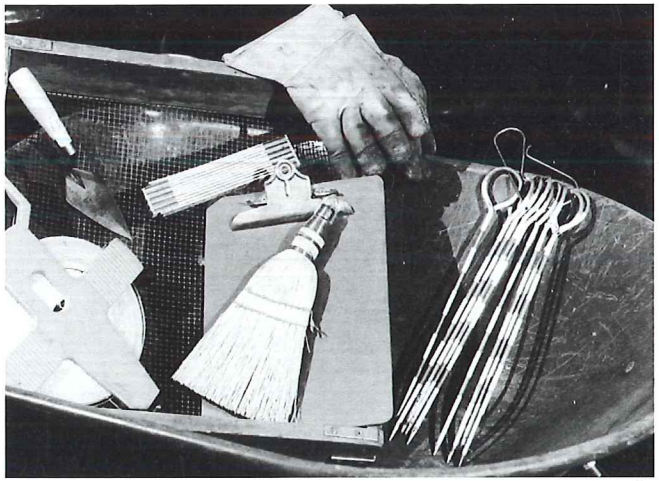
For example, Confederate soldiers killed in March 1862 at Glorieta Pass in New Mexico were buried one over another. Archaeologists excavating the site have taken care to reveal the burials layer by layer so that they can know which artifacts go with which skeleton. In this way, investigators can use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

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. Surveyors' instruments are used at large sites that have many excavation areas. At some sites, excavation is done with water sprayed through hoses. Other sites lie beneath rivers, sinkholes, lakes, and oceans, and require scuba diving and specialized underwater tools. 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.

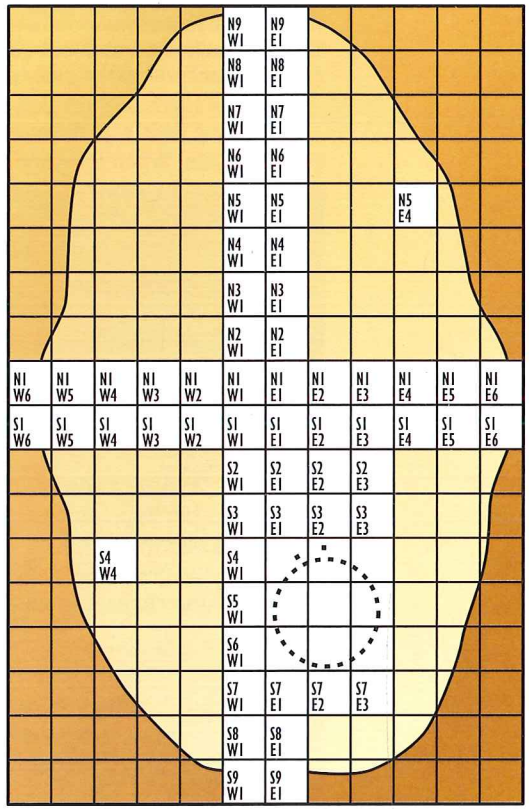
Techniques of Excavation

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.

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).

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.

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 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).

Plant remains tell not only what was eaten, but also what was burned.

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.

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.

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.

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.

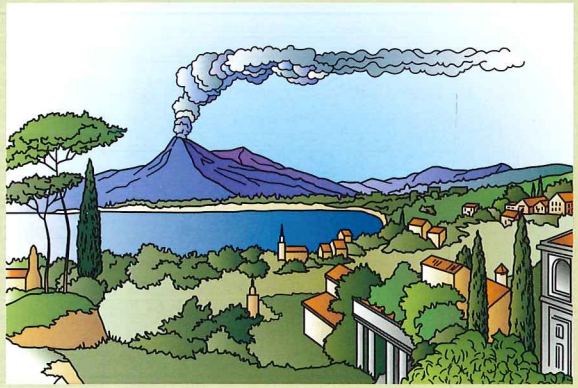
Though quite rare, catastrophic events such as fires, floods, avalanches, and volcanic eruptions may drastically reshape an area.

Sites are created by the activities of everyday living and by the reuse of a location 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. 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 next to a piece of pottery in a storage pit feature can make a good guess that the tool and the pottery are about the same age, were probably used at about the same time, and may have been used by the same person. The principle of association would lose its value if somebody were to dig up the tool, thereby rearranging the distinctive soil filling the storage pit and covering the artifacts. 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.

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.

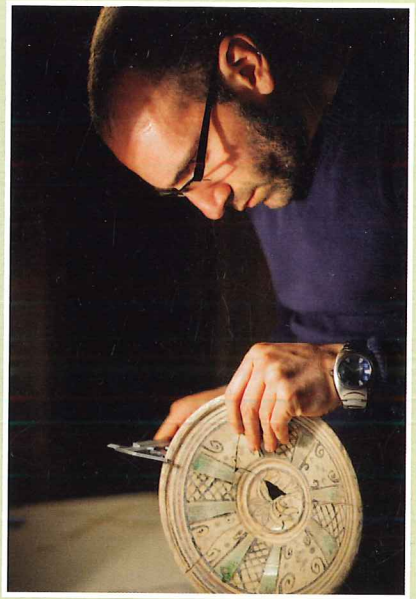
Artifact Identification and Examination

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.

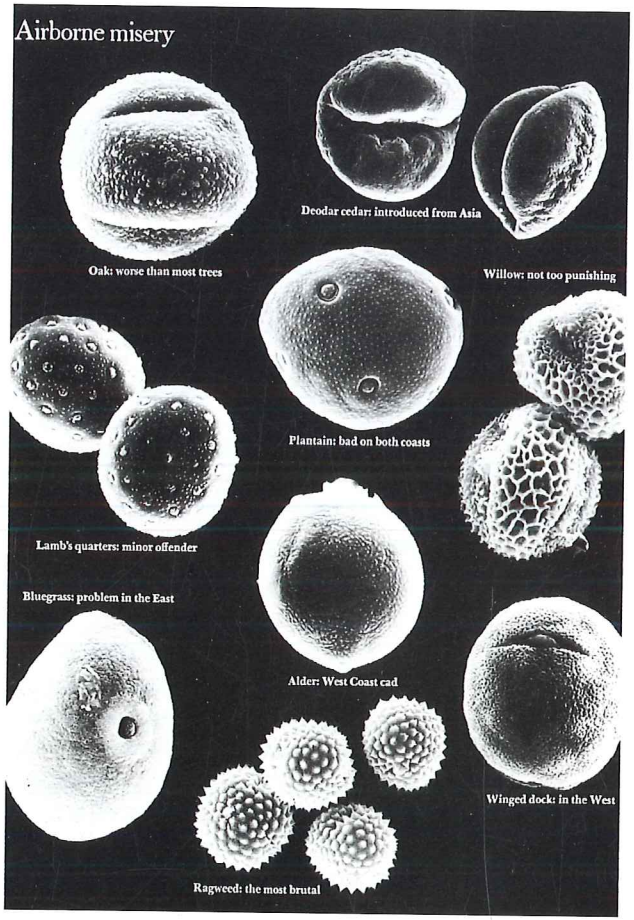
Less common than stone tools or clay pots are perishable artifacts made of wood, plant fibers, animal sinew, and other *organic* materials (materials that were once living). These objects excite particular interest because they are so rare. Dry caves occasionally yield well-preserved baskets, bits of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

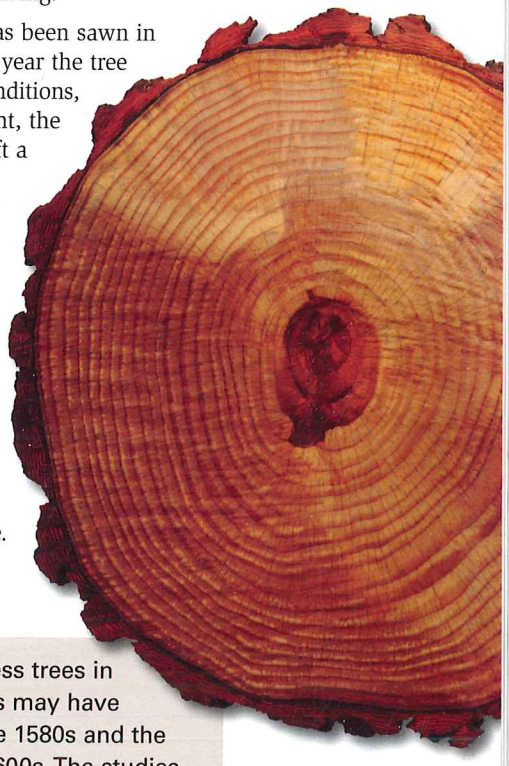
These ways of estimating the ages of artifacts are called *relative* dating techniques because the date of one artifact or site is related to the date of another artifact or site. Powerful scientific tools exist for more accurate dating—that is, for assigning an estimated age to an artifact or a site.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

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.

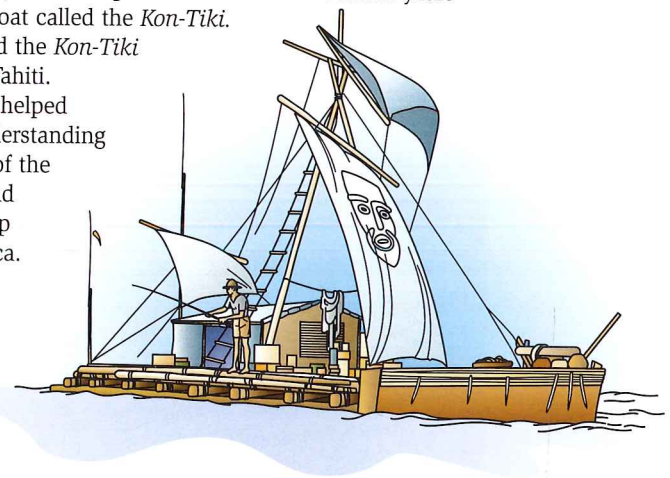
So, if two cultures are alike in some ways, they probably will be alike in other ways. To find clues about how people lived in the past, researchers can study the native peoples who still live in an area or who make items similar to artifacts that have been found in archaeological sites. No groups like 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.

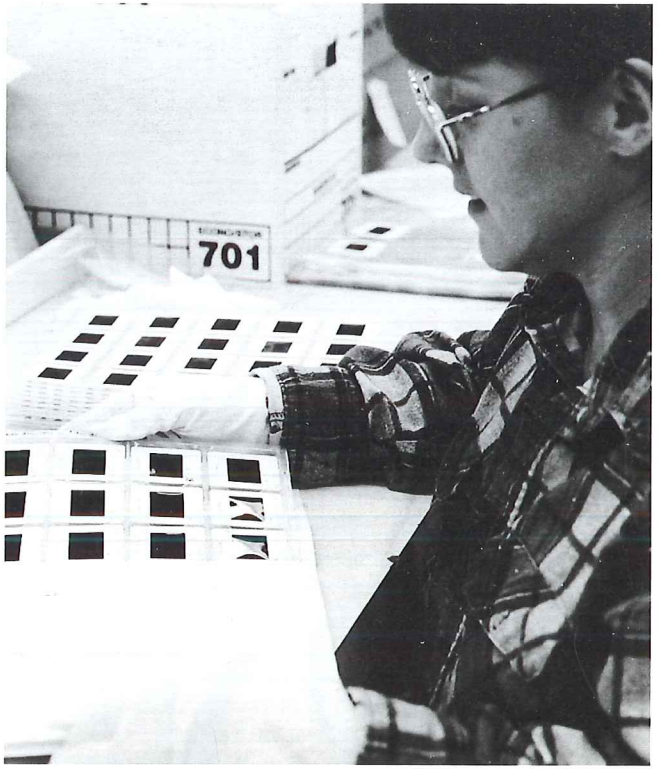


To show that South American Indians could have migrated to Pacific islands, in 1947 Thor Heyerdahl and a small crew sailed the *Kon-Tiki* from Peru to the islands of Polynesia. The *Kon-Tiki,* made of balsa, was modeled after rafts used by Peruvians in ancient times.

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.