Archaeo-Tech:
Introducing Experimental Archaeology

Cultural Resources Education

Created by Jacob Hamill, SCDNR Heritage Trust Public Information Coordinator (2019).

Grade Levels
Grades 3-6

Estimated Time
30 – 45 minutes

Goal
Students will learn that the fundamental goal of archaeology is to study past human cultures, and how artifacts (objects made, modified, or used by people) are important clues to understanding past cultures. Students will observe artifacts from Pockoy Island Shell Ring 1, a Late Archaic site on the coast of South Carolina., and hypothesize how these artifacts were made and used. After making their observations and hypotheses, students will watch the *Archaeo-Tech: Shell Tools* video and discuss how archaeologists test their hypotheses by replicating artifacts and testing supposed manufacturing techniques. This subfield of archaeology is called experimental archaeology.

Objectives

After completing the activity and viewing the *Archaeo-Tech: Shell Tools* video, students will be able to:

1. *Define* what an artifact is.
2. *Give examples* of artifacts an archaeologist might find at a prehistoric site in North America or in South Carolina and *discuss* what is and is not preserved in the archaeological record.
3. *Explain* why archaeologists are interested in studying sites and artifacts.
4. *Analyze* photographs of artifacts from an archaeological site in South Carolina and *hypothesize* how the artifacts were made and used.
5. *Imagine* what life was like for the Late Archaic inhabitants of Pockoy Island based off material remains (items that people make and use).
6. *Observe* experimental archaeology in the *Archaeo-Tech: Shell Tools* video and *explain* experimental archaeology's utility in studying past people and cultures.
7. Using previous observations and hypotheses, as well as information from the *Archaeo-Tech: Shell Tools* video, *propose* experiments for artifacts observed in the lesson that test how an artifact was made and used.

South Carolina Academic Standards

Science

3.S.1 The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

3.S.1A The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.

- **3.S.1A.1** Ask questions that can be (1) answered using scientific investigations or (2) used to refine models, explanations, or designs.
- **3.S.1A.2** Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
- **3.S.1A.4** Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.
- **3.S.1A.6** Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
- **3.S.1A.8** Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support explanations, claims or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.

4.S.1 The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

4.S.1A The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.

- **4.S.1A.1** Ask questions that can be (1) answered using scientific investigations or (2) used to refine models, explanations, or designs.
- **4.S.1A.2** Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
- **4.S.1A.6** Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
- **4.S.1A.8** Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support explanations, claims or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.

5.S.1 The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

5.S.1A The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineering.

- **5.S.1A.1** Ask questions used to (1) generate hypotheses for scientific investigations or (2) refine models, explanations, or designs.

- **5.S.1A.2** Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
- **5.S.1A.6** Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
- **5.S.1A.8** Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support hypotheses, explanations, claims, or designs. Communicate observations and explanations using the conventions and explanations of oral and written language.

6.S.1 The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

6.S.1A The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.

- **6.S.1A.1** Ask questions to (1) generate hypotheses for scientific investigations, (2) refine models, explanations, or design, or (3) extend the results of investigations or challenge claims.
- **6.S.1A.2** Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
- **6.S.1A.6** Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
- **6.S.1A.8** Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.

Social Studies

3-1.1 Categorize the six landform regions of South Carolina – the Blue Ridge, the Piedmont, the Sand Hills, the Inner Coastal Plain, the Outer Coastal Plain, and the Coastal Zone – according to their climate, physical features, and natural resources.

3-1.2 Describe the location and characteristics of significant features of South Carolina, including landforms; river systems such as the Pee Dee River Basin, the Santee River Basin, the Edisto River Basin, and the Savannah River Basin; major cities; and climate regions.

3-1.3 Explain interactions between the people and the physical landscape of South Carolina over time, including the effects on population distribution, patterns of migration, access to natural resources, and economic development.

3-2.1 Compare the culture, governance, and physical environment of the major Native American tribal groups of South Carolina, including the Cherokee, Catawba, and Yemassee.

4-1.2 Compare the everyday life, physical environment, and culture of the major Native American cultural groupings, including the Eastern Woodlands, the Plains, the Southwest, the Great Basin, and the Pacific Northwest.

6-1.1 Explain the characteristics of hunter-gatherer groups and their relationship to the natural environment.

6-4.4 Explain the contributions, features, and rise and fall of the North American ancestors of the numerous Native American tribes, including the Adena, Hopewell, Pueblo, and Mississippian cultures.

Activity Type: In-Class

This lesson is to be done as an in-class activity. The teacher will provide the required materials and necessary instructions.

Materials

- Lesson Handout (1 per student)
- Images of Pockoy Shell Ring artifacts (can be displayed to the class using a SMART board or projector).

Pockoy Shell Ring Background Information

- **Pockoy Island** (pronounced Pock-ee) is a remote South Carolina sea island and a part of the SC Department of Natural Resource's Botany Bay Heritage Preserve and Wildlife Management Area. The property is located on the northeastern corner of Edisto Island in Charleston County.
- Botany Bay is one of the largest relatively undeveloped wetland ecosystems on the Atlantic Coast, providing a critical habitat for numerous wildlife species.
- The **cultural resources** of Botany Bay are equally important, with sites dating from approximately 4,000 years ago to the nineteenth century. Several sites are listed on the National Register of Historic Places, including the outbuildings from Bleak Hall Plantation, granite markers from the 1850 Alexander Bache U.S. Coast Survey, and the Fig Island Shell Rings.
- The shell ring on Pockoy Island was first identified in early 2017 by analysts studying Hurricane Matthew's effect on South Carolina's coastline. When studying maps produced by aerial light detection and ranging, or LIDAR, analysts noticed strange circular features on the coast of Pockoy Island, indicating the presence of a shell ring. Shovel testing began in the summer of 2017, which confirmed the ring's existence. Radiocarbon dating conducted on recovered animal bone revealed that the site was approximately 4,300 years old, making it the oldest known shell ring in South Carolina.
- Testing continued in late 2017, and large-scale **excavations** were conducted in May and December of 2018, and May of 2019.
- **Shell rings** are structures found along the coasts of South Carolina, Georgia, and Florida, dating to the Late Archaic period (roughly 5,000 – 3,000 years ago). Dating suggests that the shell ring on Pockoy Island was built over a relatively short period of time, around 20 – 30 years.
- As the name indicates, shell rings are large circular or semi-circular structures made from piled shell. Some are C-shaped and U-shaped, while others are irregularly shaped or made up of multiple shapes. Pockoy's shell ring is doughnut shaped. Shell rings are primarily composed of oyster shell, but cockles, periwinkles, clams, and whelk shells are also commonly found. Shell rings range in size from 30 to 250 meters in diameter and are between 1 and 6 meters high. The Pockoy shell ring is approximately 60 meters in diameter.

- Another key feature of a shell ring is a central area called a plaza, which is devoid of shell. Archaeologists speculate that this area was maintained for ceremonial purposes or contained some sort of structure.
- Archaeologists have been studying shell rings for decades but there is still a lot we do not know about them.
- Archaeologists are unsure if shell rings were intentionally built or not. Some argue that shell rings were inadvertently created from piles of discarded shell following meals over a long period of time. Others believe shell rings were planned structures built from leftover shells from ceremonial feasts and other quarried shell.
- Archaeologists are also unsure what shell rings were used for. Some believe shell rings were sites of general human occupation, while others theorize shell rings were ceremonial structures only used for specific purposes at specific times.
- Archaeologists have recovered thousands of **artifacts** from Pockoy and other shell ring sites. The most common artifacts are pottery, shell, and animal bone.
    - The pottery found at Pockoy belongs to the earliest types of ceramics found in South Carolina. Many of the potsherds found at Pockoy are decorated with punctations, incised lines, or stamped designs. The people who created this pottery used shells, reeds, and other natural materials to produce these effects.
    - Shells were not only used to build the ring, they were also used as tools and for decoration. The Late Archaic inhabitants of Pockoy modified whelk shells and other shells to create hammers, awls, adzes, hoes, and other necessary tools for everyday life. They also turned shells into jewelry by shaping them into beads.
    - Animal bone is normally not well preserved because of the acidity of South Carolina's soil. However, bone is plentiful at Pockoy because the calcium from the shell raises the soil's pH level, preserving the bone. Worked bone is frequently found at Pockoy and archaeologists have recovered numerous finely decorated bone pins.
- What archaeologists do not find at a site can also tell a lot about the people that lived there. Very little stone has been found at Pockoy, telling archaeologists that the people that once lived there did not rely primarily on stone tools. Some archaeologists interpret this as evidence that the shell ring was not a site of general human occupation, but others propose that this is reflective of the local environment; good stone is hard to find on the coast so people living there relied on tools made out of shell and bone.
- Due to Pockoy's location on the coast, the site is vulnerable to coastal erosion and rising sea levels. With a rate of 9.5 meters of coastline lost per year, Pockoy is expected to be completely engulfed by the ocean by 2024.
- Climate change, or "heritage at risk", poses a serious challenge to archaeologists, and Pockoy is not the only site facing destruction. According to a report by DINAA (The Digital Index of North American Archaeology), a one-meter rise in sea level would result in the loss of 13,583 archaeological sites across the Southeastern United States. It is imperative to salvage, protect, and study these vulnerable sites before they are gone.

Vocabulary

- **Adze:** A tool similar to an axe with an arched blade at right angles to the handle. Used for cutting or shaping large pieces of wood.
- **Anthropology:** The study of humans, past and present. In the United States, the study of Anthropology is divided into four subfields (Sociocultural Anthropology, Biological or Physical Anthropology, Archaeology, and Linguistic Anthropology).
- **Archaeological Site:** A place where human activity occurred and material remains were deposited.
- **Archaeologist:** An Anthropologist (social scientist) who studies the material remains of past human activity.
- **Archaeology:** The scientific study of past human cultures by analyzing the material remains (sites and artifacts) that people left behind.
- **Artifact:** Any object made, modified, or used by people.
- **Atlatl:** A device used to achieve greater leverage and velocity for throwing a spear or dart. Atlatls typically consist of a board with a hook at the end to hold the spear or dart in place until released.
- **Bone Pin:** Small, carved bone objects that are often decorated and may have served as hair pins or parts of clothing. Bone pins are made from deer bone.
- **Chert:** A dense silica rock used to manufacture stone tools such as projectile points.
- **Context:** The relationship of artifacts and other cultural remains to each other and the situation in which they are found.
- **Cultural Resources:** Evidence of past human activity. They include archaeological sites, historic homes, battlefields, burial grounds, shipwrecks, historic and prehistoric artifacts.
- **Culture:** A set of learned beliefs, values, and behaviors or way of life shared by the members of society.
- **Excavation:** The systematic digging and recording of an archaeological site.
- **Experimental Archaeology:** A branch of archaeology that studies past technology by reproducing it or by recreating a type of site to study the processes of site formation.
- **Feature:** Material remains that cannot be removed from a site such as roasting pits, fire hearths, house floors or post molds.
- **Function:** The way in which something was used; its purpose.
- **Hypothesis:** A tentative assumption that can be further investigated.
- **Material Culture:** Items that people make and use.
- **Pottery:** Pots, bowls, and other vessels made from clay and hardened by heat (firing).
- **Prehistoric:** The period of time before written records. Dates vary in different geographical areas.
- **Projectile Point:** A general term for stone points that were hafted to darts, spears or arrows.
- **Shell Ring:** Large circular or semi-circular structures made from piled shell. In the southeastern United States these structures date to the Late Archaic period (5,000 – 3,000 years ago) and are found along the coasts of South Carolina, Georgia, Florida, and Mississippi.
- **Sherd:** A piece of broken pottery or ceramic.
- **Temper:** Material that potters mix with clay in order to strengthen the clay. This makes a vessel less likely to crack during drying or firing. Shell, plant fibers, and sand are examples of temper.
- **Whelk:** A predatory marine mollusk with a heavy pointed spiral shell.

Lesson

1. Before beginning this lesson, students should have a basic understanding of what archaeology is and be familiar with key vocabulary terms, like artifact, site, excavation, and prehistory. Students should also be able to draw on prior knowledge of prehistoric cultures in North America and South Carolina.
2. Begin the lesson by asking the class to define the term *artifact*. Have your students brainstorm examples of artifacts an archaeologist might find at a prehistoric site in South Carolina or in North America and make a list of your students' answers on the board. Have your students use their knowledge of South Carolina or North American prehistory to answer this question. Take the time to correct students if they propose things that would not be preserved in the archaeological record.
3. Ask your students why archaeologists study artifacts. Stress that archaeologists study artifacts because they want to understand the people that made the artifacts.
4. Tell your class that they will now look at photographs of real artifacts from a prehistoric site in South Carolina that is approximately 4,000 years old (as old as the oldest pyramids in Egypt). Encourage your students to imagine what life was like in South Carolina 4,000 years ago.
5. Explain to your students that because prehistoric sites predate written records, there are no instructions on how these artifacts were made or used. Ask your students how archaeologists can determine how an artifact was made and used if there are no written records.
6. Show your class photographs of the shell tools, pottery, and bone pins from the Pockoy Island shell ring included in the lesson plan.
7. On a sheet of paper, have your students make careful observations about the artifacts, noting what the artifacts are made of, the structure of the artifacts, and what these artifacts can tell us about the people that created them. If students are completely stumped, have them brainstorm hypotheses as a class or give them hints if necessary.
8. Explain that archaeologists study artifacts (and by extension the people that made the artifacts) by analyzing an artifact's characteristics, by studying the artifact's context and its relationship to other artifacts from the same site, and by comparing their findings to similar sites and other archaeological research. Explain that archaeologists are interested in how artifacts were made and used because it gives archaeologists a better understanding of the lives of past people. A subfield of archaeology called experimental archaeology involves recreating material culture and testing the lifeways of past people to test hypotheses and provide archaeologists with a better understanding of the past.
9. Show your students the *Archaeo-Tech: Shell Tools* video.
10. Discuss the video with your students. What did they see in the video? How do archaeologists study past people and cultures in the video? How accurate were your students' observations and hypotheses?
11. Look back at the artifacts from Pockoy. Ask your students to propose ways archaeologists could replicate and test the artifacts shown in the photographs.

References

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Pockoy Shell Ring Artifacts

Show the following photographs to your class. Do not include the image titles when you show them the photos. Students are not expected to accurately identify what the artifacts are, but are instead supposed to make observations about the artifact to make hypotheses about how the artifact was made, how it was used, and what it tells us about the lives of the people that inhabited Pockoy 4,000 years ago.

Image 1 – Thoms Creek Pottery with Periwinkle Punctate Decoration

Image 2 – Thoms Creek Pottery with Periwinkle Punctate Decoration

Image 3 – Whelk Axe

Image 4 – Whelk Adze

Image 5 – Whelk Shell Tool (with body whorl removed)

Image 6 – Decorated Bone Pin