Archaeo-Tech:
Mollusk ID & Coloring Activity

Cultural Resources Education

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

Grade Levels
Grades 2-6

Estimated Time
1 hour – 1 ½ hours

Goal
Students will be able to identify various species of mollusk found on or near the South Carolina coast, understand the basic anatomy and taxonomic organization of different species, and explain how local mollusks were exploited by indigenous Americans thousands of years ago as both a food source and as a raw material for tools, structures, and decorations.

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

1. *Give examples* of common mollusk species found on the coast of South Carolina.
2. *Identify* and *categorize* mollusks taxonomically based on anatomical characteristics, such as the shell shape.
3. *Label* different parts of a mollusk's shell using correct vocabulary.
4. *Discuss* the habitats of different mollusks found in South Carolina, and *explain* how some species, like the oyster, are a keystone species for their ecosystem.
5. *Relate* the consumption of shellfish today to the consumption of shellfish by coastal indigenous Americans in South Carolina thousands of years ago.
6. *Understand* and *describe* what a shell ring is, how old it is, and where shell rings are found in South Carolina.
7. *Hypothesize* how the prehistoric people on the coast of South Carolina used shellfish as a food source and as a raw material for tools, structures, and decorations.
8. *Observe* experimental archaeology in the *Archaeo-Tech: Shell Tools* video and *explain* experimental archaeology's utility in studying past people and cultures.
9. *Connect* the material culture found at the Pockoy Island Shell Ring to the local environment and available natural resources and *explore* the connection between modern culture and the local environment.

South Carolina Academic Standards

Science

2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.

- **2.L.5A.1** Obtain and communicate information to classify animals (such as mammals, birds, amphibians, reptiles, fish, or insects) based on their physical characteristics.
- **2.L.5A.2** Construct explanations for how structures (including structures for seeing, hearing, grasping, protection, locomotion, and obtaining and using resources) of different animals help them survive.

3.L.5 The student will demonstrate an understanding of how the characteristics and changes in environments and habitats affect the diversity of organisms.

- **3.L.5A.1** Analyze and interpret data about the characteristics of environments (including salt and fresh water, deserts, grasslands, forests, rain forests, and polar lands) to describe how the environment supports a variety of organisms.

4.L.5 The student will demonstrate an understanding of how the structural characteristics and traits of plants and animals allow them to survive, grow, and reproduce.

- **4.L.5A.1** Obtain and communicate information about the characteristics of plants and animals to develop models which classify plants as flowering or nonflowering and animals as vertebrate or invertebrate.
- **4.L.5B.3** Construct explanations for how structural adaptations (such as methods for defense, locomotion, obtaining resources, or camouflage) allow animals to survive in the environment.

5.L.4 The student will demonstrate an understanding of relationships among biotic and abiotic factors within terrestrial and aquatic ecosystems.

- **5.L.4A.2** Obtain and communicate information to describe and compare the biotic factors (including individual organisms, populations, and communities) of different terrestrial and aquatic ecosystems.
- **5.L.4B.1** Analyze and interpret data to explain how organisms obtain their energy and classify organisms as producers, consumers (including herbivore, carnivore, and omnivore), or decomposers (such as fungi and bacteria).

6.L.4 The student will demonstrate an understanding of how scientists classify organisms and how the structures, processes, behaviors, and adaptations of animals allow them to survive.

- **6.L.4A.2** Develop and use models to classify organisms based on the current hierarchical taxonomic structure (including the kingdoms of protists, plants, fungi, and animals).
- **6.L.4B.1** Analyze and interpret data related to the diversity of animals to support claims that all animals (vertebrates and invertebrates) share common characteristics.
- **6.L.4B.2** Obtain and communicate information to explain how the structural adaptations and processes of animals allow for defense, movement, or resource obtainment.

Social Studies

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 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.

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

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)
- Coloring utensils (crayons, colored pencils, markers)

Mollusk Background Information

- **Mollusks** (of the phylum *Mollusca*) are a large and diverse group of marine and terrestrial invertebrates. With somewhere between 50,000 – 200,000 individual species, mollusks are found in nearly every habitat on Earth and have existed for over 550 million years.
- All mollusks have a soft body, which is subdivided into four broad regions: the "head", "foot", "visceral mass", and "mantle".
    - The **foot** is the muscular organ a mollusk uses to crawl around on. The shape of the foot is dependent on the animal's method of locomotion and its environment. For example, the foot of a land snail is very different from the foot of a squid.
    - The **head** typically contains a pair of eyes, a pair of tentacles, and a mouth, but not every species of mollusk has a discernable "head" (see bivalves).
    - The **visceral mass** is a sac or mound that contains the mollusk's digestive organs.
    - The **mantle** is a tough outer layer that covers the mollusk's visceral mass, like how our skin covers and protects our internal organs. The mantle is also the part of the mollusk's body that secretes the mollusk's shell.
- Many species of mollusk are protected by a hard exoskeleton, or a **shell**, which is made from calcium-carbonate, but not all mollusks have a shell, like octopi and slugs. Mollusks can be classified into different groups based on the presence or the appearance of their shells.
- The phylum *Mollusca* is divided into seven subgroups (called classes).
    - **Gastropods** (*Gastropoda*) or snails, are the largest group of mollusks, making up about 80% of all mollusk species. Gastropods are the only class of mollusk found on land. Gastropods vary in size, body, and shell shape, but are broadly identified by having a single, spiral-shaped shell that coils around a central axis called a **columella**.
    - **Bivalves** (*Bivalvia*) are another major group of mollusks. Bivalves are characterized by a two-halved shell held together by a muscle, which works like a hinge. Common bivalves include oysters, clams, and scallops. Many bivalves use their large foot to bury under the ocean sediment, which protects them from predators. They extend a **siphon** to the surface to breath, filter water, and capture food.

    - **Cephalopods** (*Cephalopoda*) are the largest and most intelligent species of mollusk. Most cephalopods do not have a shell, like the octopus and squid. The exception is the chambered nautilus, which has a flat, coiled shell. Cephalopods are predators and are characterized by their tentacles, which are used to capture prey.
    - Other classes of mollusk include tusk shells (*Scaphopoda*), neopilina, nicknamed "living fossils" (*Monoplacophora*), chitons (*Polyplacophora*), and the shell-less, worm-like *Aplacophora*.
- Most species of mollusk are marine organisms. Only bivalves and gastropods have adapted to freshwater, and only gastropods have adapted to a terrestrial environment.
- A mollusk's shell is made mostly of calcium-carbonate, which is obtained from food or from the environment. The mollusk's shell is a part of the organism and grows over the course of the organism's lifetime. Food, climate, environment conditions, history, and genetics all effect the shape and color of a mollusk's shell. For example, rough water conditions will discourage the growth of spines on spiny species, while calm conditions encourage the growth of long spines. Old mollusks have shells that are thicker and duller compared to younger mollusks.
- Because of the sheer diversity of mollusk species, mollusks have a wide range of diets. Many mollusks feed on algae and microscopic organisms, like protists. Some chitons and gastropods are strictly herbivores, but other gastropods are carnivores and detritivores. Some carnivorous gastropods use a hard, harpoon-like tooth called a **radula** to hunt other mollusks by drilling a hole into the shell of their prey. Cephalopods are mainly predators, feeding on fish, crustaceans, and other mollusks. Bivalves are **filter feeders**, taking in water and filtering out bacteria, protists, and diatoms.
- There are many mollusk species found in South Carolina. Most are found along the coast, in tidal creeks, estuaries, and salt marshes, but garden snails can be found all over the state. Some mollusks are even **keystone species**, a species that shapes an ecosystem and on which a number of other species in the ecosystem rely.
- For example, the **oyster** is a keystone species of the salt marsh ecosystem. To mature from a free-floating plankton to an adult oyster, young oysters must find and attach themselves to a hard surface. Most often, the best surfaces to attach to are the shells of other oysters. As oysters attach and grow off each other they form expansive reefs, and these reefs are important for maintaining the well-being of the salt marsh. As filter feeders, oysters improve the water quality by filtering and removing various bacteria and sediments. They also protect shorelines from erosion and provide a habitat for crabs, worms, and fish.
- Mollusks have long been an important food source in South Carolina. Found along the state's coast are a number of shell rings and shell middens dating back thousands of years. These man-made structures were created by prehistoric Native Americans, who exploited the abundance of shellfish found in South Carolina's coastal environments. These structures are primarily made of oyster shell but also include whelk, mussel, clam, periwinkle, and other mollusk shell. Turtle shell, crab craws, fish bones, stingray jaw plates, and mammal remains (such as deer, raccoon, and opossum) are also found mixed in with the mollusk shell, giving archaeologists a picture of people's diets thousands of years ago.

Pockoy 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 them 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 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).
- **Aperture:** The opening to a mollusk's shell.
- **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.
- **Bivalve (*Bivalvia*):** A class of mollusk. Bivalves are characterized by a two-halved shell held together by a muscle, which works like a hinge. Common bivalves include oysters, clams, and scallops.
- **Cephalopod (*Cephalopoda*):** A class of marine mollusks including squids, cuttlefish, and octopuses that move by expelling water from a tubular siphon under the head and that have a group of muscular, usually sucker-bearing, arms around the front of the head.
- **Columella:** The central axis around which the shell of a gastropod coils.
- **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 a 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.
- **Foot (Mollusk):** The muscular organ a mollusk uses to move around on. The shape of the foot is dependent on the animal's method of locomotion and its environment.
- **Function:** The way in which something was used; its purpose.
- **Gastropod (*Gastropoda*):** The largest class of mollusk. Gastropods vary in size, body, and shell shape, but are broadly identified by having a single, spiral-shaped shell that coils around a central axis called a columella. However, some gastropods do not have a shell, such as a slug.
- **Head (Mollusk):** The part of the mollusk that contains the organism's sensory organs and its "brain". Not every species of mollusk has a discernable head.
- **Hypothesis:** A tentative assumption that can be further investigated.
- **Mantle (Mollusk):** The tough outer layer of the mollusk's body that covers the visceral mass. The mantle is also the part of mollusk's body that secretes the shell.

- **Material Culture:** Items that people make and use.
- **Mollusk:** An invertebrate belonging to a large phylum that includes snails, slugs, mussels, and octopuses. Mollusks typically have a soft unsegmented body and live in marine or damp terrestrial environments, and most have an external calcareous shell.
- **Oyster:** A type of marine bivalves with rough, irregular shells that are commonly eaten and farmed by humans.
- **Prehistoric:** The period of time before written records. Dates vary in different geographic areas.
- **Radula:** A hard, harpoon-like tooth found in carnivorous gastropods.
- **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, and Florida.
- **Shell:** The hard, protective outer case of a mollusk or crustacean.
- **Visceral Mass (Mollusk):** The region of a mollusk that contains the organism's digestive organs.
- **Whelk:** A predatory marine gastropod with a heavy pointed spiral shell.

Lesson

1. Ask your students to raise their hand if they have been to the beach before. Did they see any seashells when they were at the beach? Ask them to describe the shells they saw.
2. Explain to your students that seashells are the exoskeletons of a group of animals called mollusks. Mollusks are grouped into different classes depending on the characteristics of their shell, but some mollusks do not have a shell.
3. Go over the basic characteristics, anatomy, and classification of mollusks. Discuss the varied diets and habitats of mollusks. Show images of different mollusk species. The content of this lesson can vary depending on the grade level and applicable academic standards.
4. Have your students give examples of mollusks that live in South Carolina and describe their habitats. Ask your students if any of them have eaten mollusk before. Did they eat oysters at an oyster roast or fried clams at a seafood restaurant? Encourage those that have to share their experiences with the class.
5. Tell your students that mollusks were also a popular food source for Native Americans living on South Carolina's coast thousands of years ago.
    a. Explain that before the domestication of plants and animals, humans had to forage or hunt all the food they consumed. We call the people that practice this kind of subsistence "hunter-gatherers".
    b. For hunter-gatherers living on the ancient coast of South Carolina, the oyster was an abundant and easily obtainable source of food. The brackish water of the salt marshes and estuaries was an ideal habitat and the oyster thrived in these conditions.
    c. Evidence of ancient hunter-gatherers exploiting the abundance of oyster and other mollusks is shown by the presence of shell rings along the South Carolina, Georgia, and Florida coasts.
    d. Explain to your students what shell rings are, how old they are, what they are made of, and how shell rings are being studied by archaeologists today. A key point is that shell rings can give us insight into the diets of people that lived thousands of years ago.

6. Distribute the "Mollusk Identification" handout. Explain that all the mollusks in this handout were found at the shell ring on Pockoy Island.
7. Pass out coloring utensils (crayons, colored pencils, markers, etc.).
8. Guide your students through the handout and have your students fill out the information for each section.
    a. Students should use the words in the Word Bank to complete the description for each shell. Students can help each other find the right answers if necessary. Have your students color the drawings of each shell using the provided coloring utensils.
    b. Discuss with your class what archaeologists observed about these shells while excavating at Pockoy. This information is included on the handout. Have your students brainstorm ways the shells may have been used by the Late Archaic people who built the shell ring thousands of years ago. Have your students write their answers on the handout.
9. Show your students the *Archaeo-Tech: Shell Tools* video. This video shows how the people of Pockoy modified whelk shells to create tools, like axes, adzes, and hammers.
10. Discuss the video with your students. Reiterate key points from the video.

11. Optional. Show your students the "Ancient Oyster" sound bite. Available at https://vimeo.com/showcase/5352761/video/348196665. Discuss this video with your students too.
12. Explain that mollusks are not the only thing the people at Pockoy ate. Turtle shell, crab claws, fish bones, stingray jaw plates, and mammal remains (such as deer, raccoon, and opossum) are also found in the shell ring, preserved for thousands of years by the calcium of the shell. Ask your students what kind of food is missing from this list. Remind your students that the people who lived at Pockoy predate agriculture. They gathered edible wild plants to supplement their diets, but plant material is not preserved in the archaeological record.
13. Conclude the lesson by exploring the connection between the shell ring and the local environment with your students. How closely were the people at Pockoy and their culture tied to the natural resources around them? How connected were these people to the local coastal environment and the mollusks that thrived in that specific habitat? Is our culture as deeply tied to our local environment today? Have your students explore these open-ended questions as a class discussion. They may also write their answers on the back of their handout.

References

Anderson, W. D. (n.d.). Knobbed Whelk [PDF File]. Retrieved from http://www.dnr.sc.gov/cwcs/pdf/Knobbedwhelk.pdf

Archaeological Shells of Florida [PDF File]. (n.d.). Florida Public Archaeology Network. Retrieved from https://www.flpublicarchaeology.org/resources/shell_guide.pdf

Bunje, P. (2007). The Mollusca: Sea slugs, snails, and scallops. Retrieved from https://ucmp.berkeley.edu/taxa/inverts/mollusca/mollusca.php

DeVictor, S. T., Knott, D. M., & Crowe, S. E. (2010). *South Carolina Beachcomber's Guide: A Guide to the Common Invertebrates, Plants and Natural Artifacts of the South Carolina Seashore.* Retrieved from https://www.academia.edu/3876050/South_Carolina_Beachcomber_s_Guide_-_A_Guide_to_the_Common_Invertebrates_Plants_and_Natural_Artifacts_of_the_South_Carolina_Seashore.

Family: Arcidae (Ark Clams). (n.d.). Washington State University Tri-Cities Gladys Archerd Shell Collection. Retrieved from http://shells.tricity.wsu.edu/ArcherdShellCollection/Bivalvia/Arcidae.html

Family: Cardiidae (Cockles). (n.d.). Washington State University Tri-Cities Gladys Archerd Shell Collection. Retrieved from http://shells.tricity.wsu.edu/ArcherdShellCollection/Bivalvia/Cardiidae.html

Keith, W. J., & Anderson, W. D. (2014). Sea Science: Oysters and Clams. Retrieved from http://www.dnr.sc.gov/marine/pub/seascience/oyster.html#clams

MacCabe, Kelley Weitzel & Miller, Sarah E. (n.d.). Tool-Making Technology [PDF File]. In *Timucuan Technology* (Chapter Three). Retrieved from https://fpan.us/resources/timucuan/3_tool.pdf

Rosenberg, G. (1992). What is a mollusk? Retrieved from https://conchologistsofamerica.org/conchology/what-is-a-mollusk/

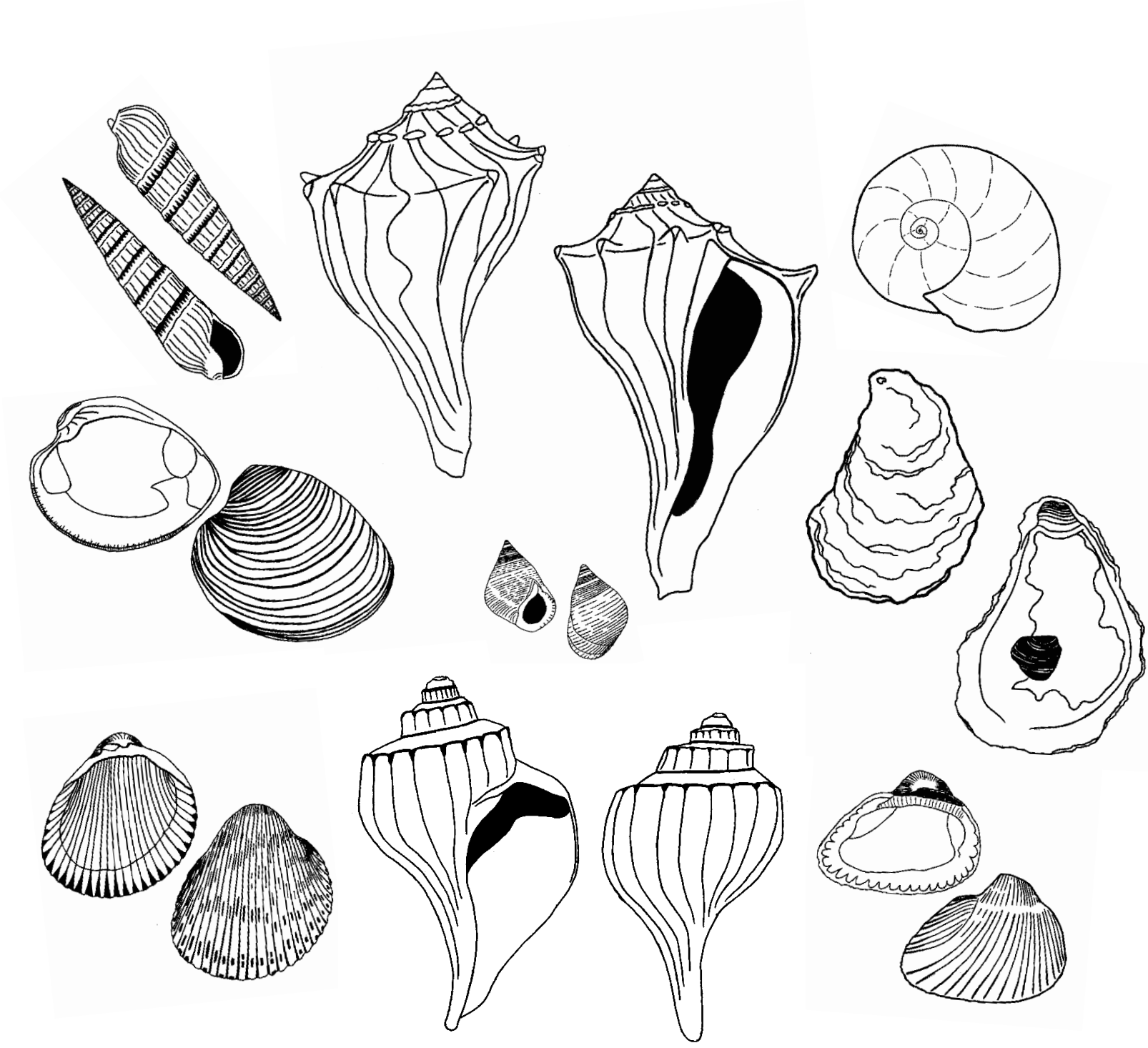
Sabelli, B. (1980). *Simon & Schuster's Guide to Shells*. H. S. Feinberg (Ed.). New York, NY: Simon & Schuster.

Scheu, L. (n.d.). What is a shell? Retrieved from https://conchologistsofamerica.org/the-shells/

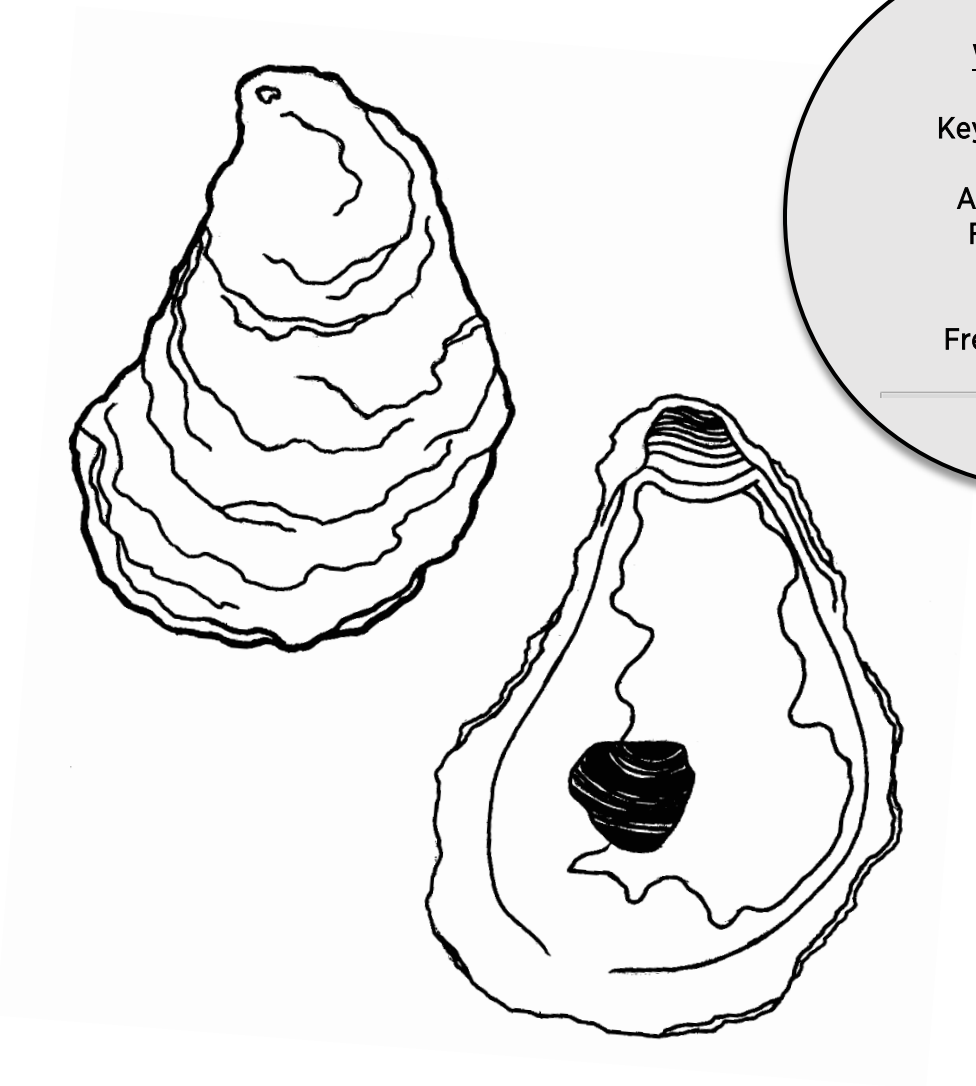
Mollusk Identification & Coloring Activity

Instructions

For this activity, use the words in the **Word Bank** on each page to complete the description for each shell. Then use the information from the description to imagine how the prehistoric people at Pockoy Island used the shellfish in their everyday lives. Some mollusk shells had similar or general uses, while other shells were used for specific purposes. When you are finished writing your answers, use the provided coloring utensils to color each shell.



Eastern Oyster (*Crassostrea virginica*)



Word Bank

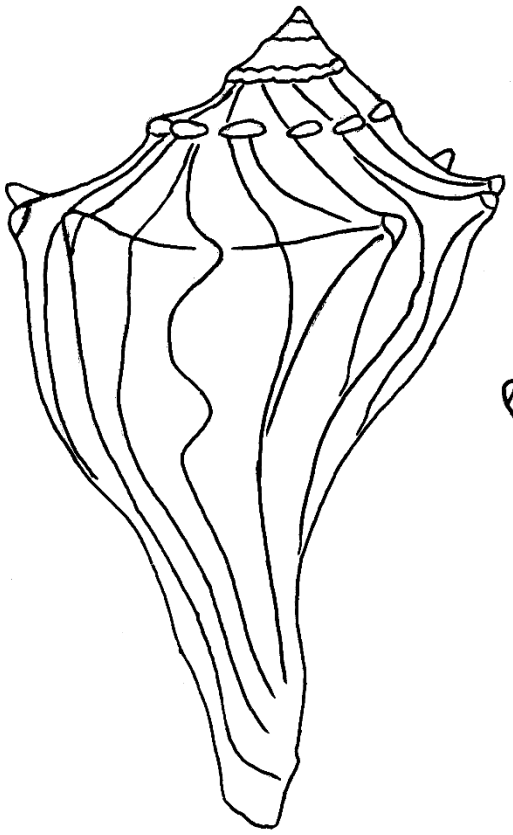
Salt Marsh
Keystone Species
Gastropod
Apex Predator
Filter Feeder
Bivalve
Pile
Freshwater Lake
Reef

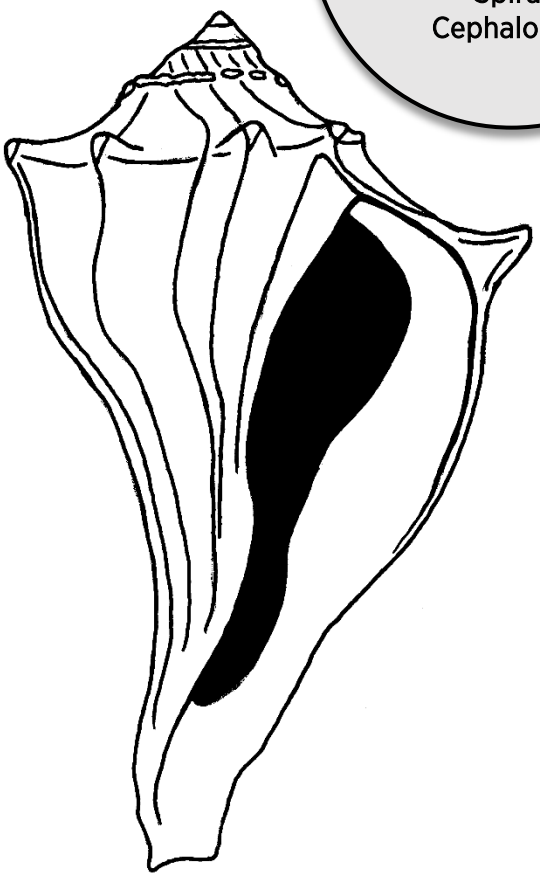
Also called the American Oyster or the Atlantic Oyster, the Eastern Oyster is a _____because it has a two-halved, hinged shell. An oyster's shell is oval shaped and ranges in color from white to gray to brown. The inside of the shell has a purple muscle scar. Oysters are a _____ of the _____ ecosystem. As _____, oysters improve the water quality by filtering and removing various particles, bacteria, and sediments. Oysters can grow together in large groups called _____, which protect shorelines from erosion and provide a habitat for crabs, worms, and fish.

The shell ring at Pockoy is mostly made of oyster shell. There is so much oyster shell at Pockoy that it would be impossible to take all the oysters back to the lab for analysis. Instead, archaeologists weigh and discard the oyster shell in the field.

How do you think the oyster was used by the prehistoric inhabitants of Pockoy?

Knobbed Whelk (*Busycon carica*)





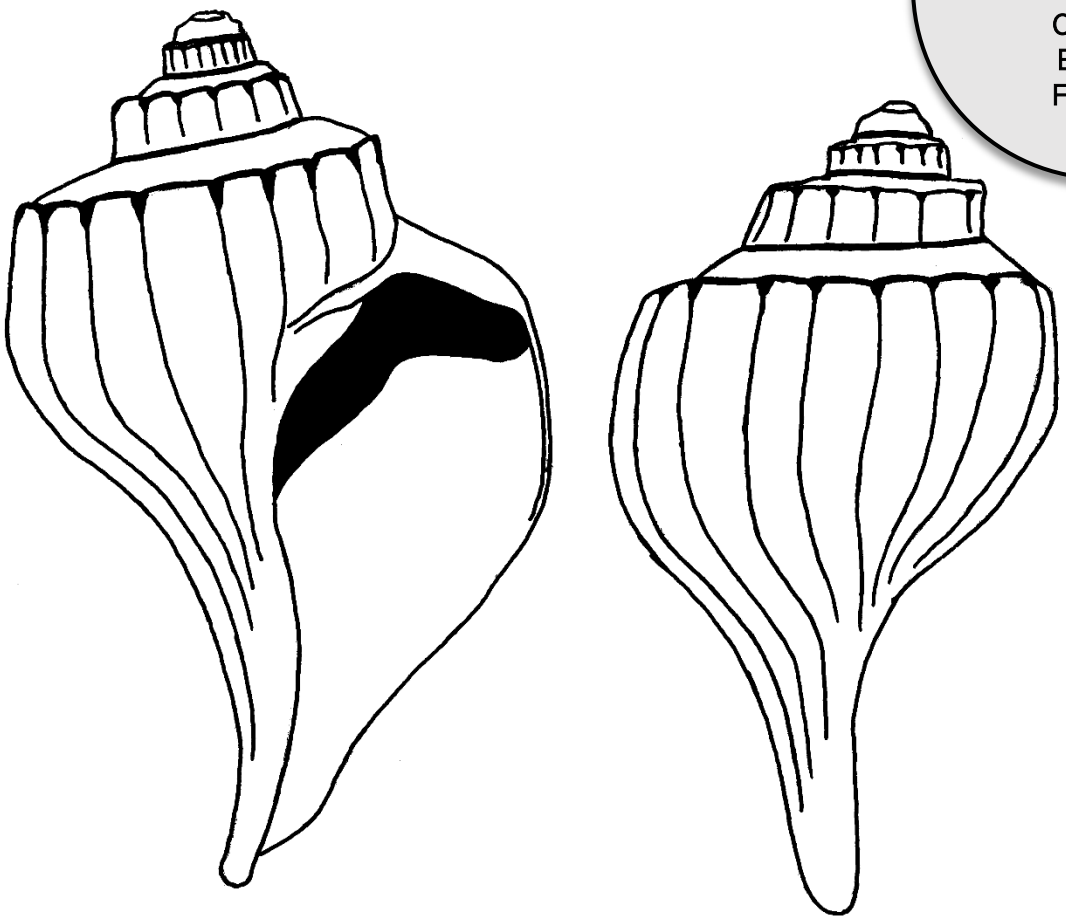
Word Bank
Gastropod
Spike
Columella
Knob
Spiral
Cephalopod

The Knobbed Whelk is the most common species of whelk found in South Carolina. Often mistaken for conchs, whelks are carnivorous _____ (snails) that feed on bivalves, like clams, oysters, and arks. The Knobbed Whelk can be easily identified by the pointy _____ on its whorl. The aperture, or the opening, of the shell is on the right-hand side. Adult Knobbed Whelks grow to about 5-9 inches in length, and range in color from light orange-yellow to brick red. Whelks grow by extending their shell around a central axis, called a _____ (tiny pillar), creating the whelk's whorls.

Archaeologists found a lot of Knobbed Whelks at Pockoy. Some whelk shells were completely whole, but archaeologists also found broken pieces of whelk shell. Long ago, people modified the whelk shells for different reasons. For example, some of the whole whelk shells had holes drilled into the whorl.

How do you think the Knobbed Whelk was used by the prehistoric people who lived at Pockoy?

Channel Whelk (*Busycotypus canaliculatus*)



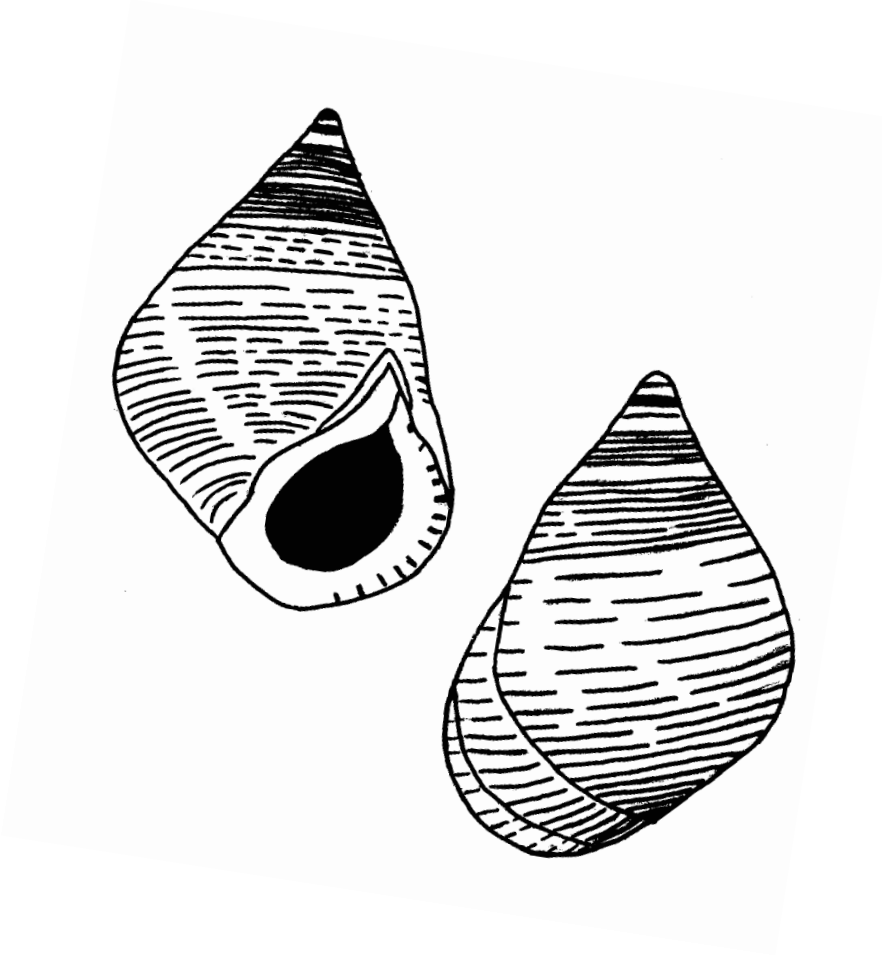
Word Bank
Aperture
Gastropod
Foot
Channel
Bivalve
Fissures

The Channel Whelk is a close relative of the Knobbed Whelk. Like its cousin, the Channel Whelk is also a predatory marine snail or _____ that feeds on other marine mollusks. Channel Whelks grow to a similar size as Knobbed Whelks. Their shells are gray to brown with darker brown or red bands, and, like the Knobbed Whelk, the shell's _____ (opening) is on the right-hand side. Unlike the Knobbed Whelk, the Channel Whelk does not have any knobs, and instead has deep _____ (or grooves) between its the whorls.

Channel Whelks were found alongside Knobbed Whelks at Pockoy, but in far fewer numbers compared to the Knobbed Whelk.

What do you think the Channel Whelk was used for? Do you think the Channel Whelk had a different use than the knobbed whelk, or the same?

Marsh Periwinkle (*Littorina irrorata*)



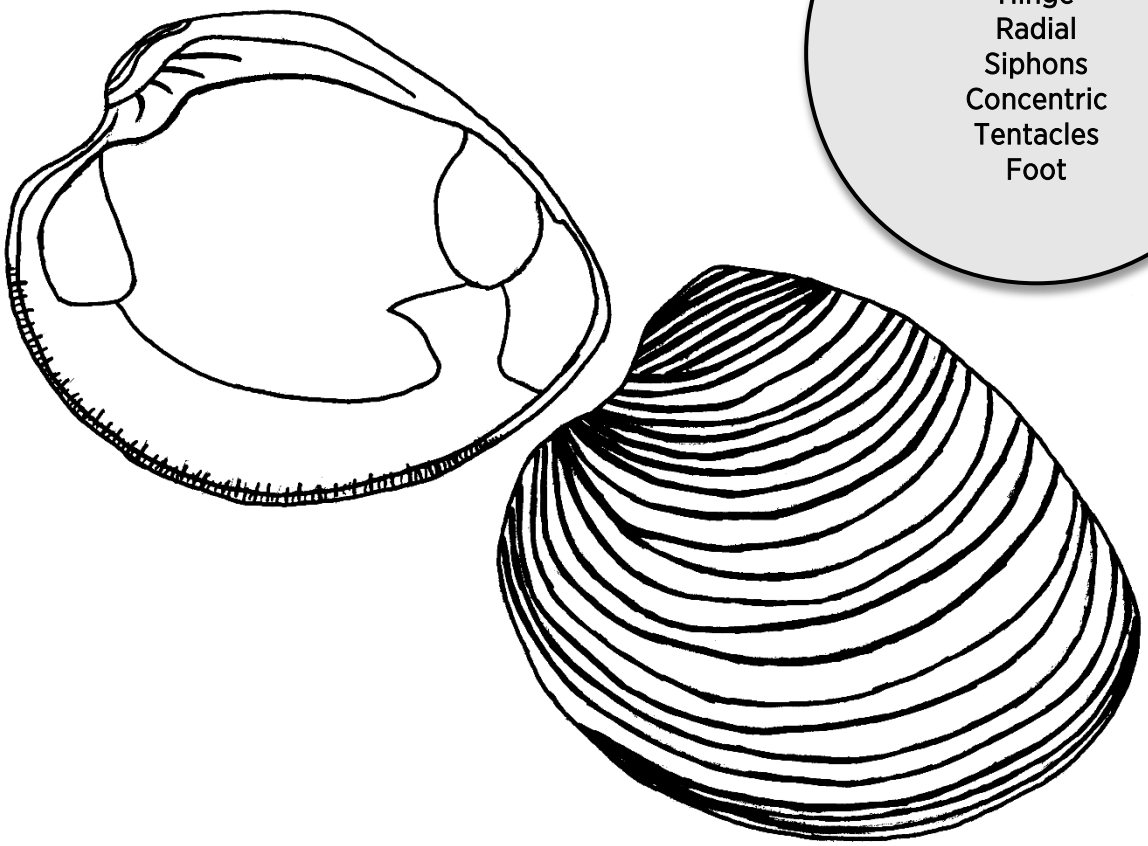
Word Bank
Bivalve Gastropod
Detritus
Decomposers
Herbivores

As its name implies, the marsh periwinkle is a tiny _____ (snail) found in salt marshes along the Gulf Coast and the Atlantic Coast of the United States. The Marsh Periwinkle can grow up to 1.25 inches in length, and the color of its shell ranges from dark brown to bleached white. The Marsh Periwinkle is an important species of the salt marsh ecosystem. Periwinkles are _____ who feed on algae and the _____ (dead and decomposing material) of smooth cordgrass (*Spartina alterniflora*). Periwinkles are easy prey for other salt marsh animals, like the blue crab, who regulate the periwinkle population.

Thousands of periwinkle shells were found at the Pockoy Island Shell Ring, meaning these tiny snails were collected in large numbers by the people who once lived there.

How do you think the periwinkle was used by the prehistoric people at Pockoy?

Quahog Clam (*Mercenaria mercenaria*)



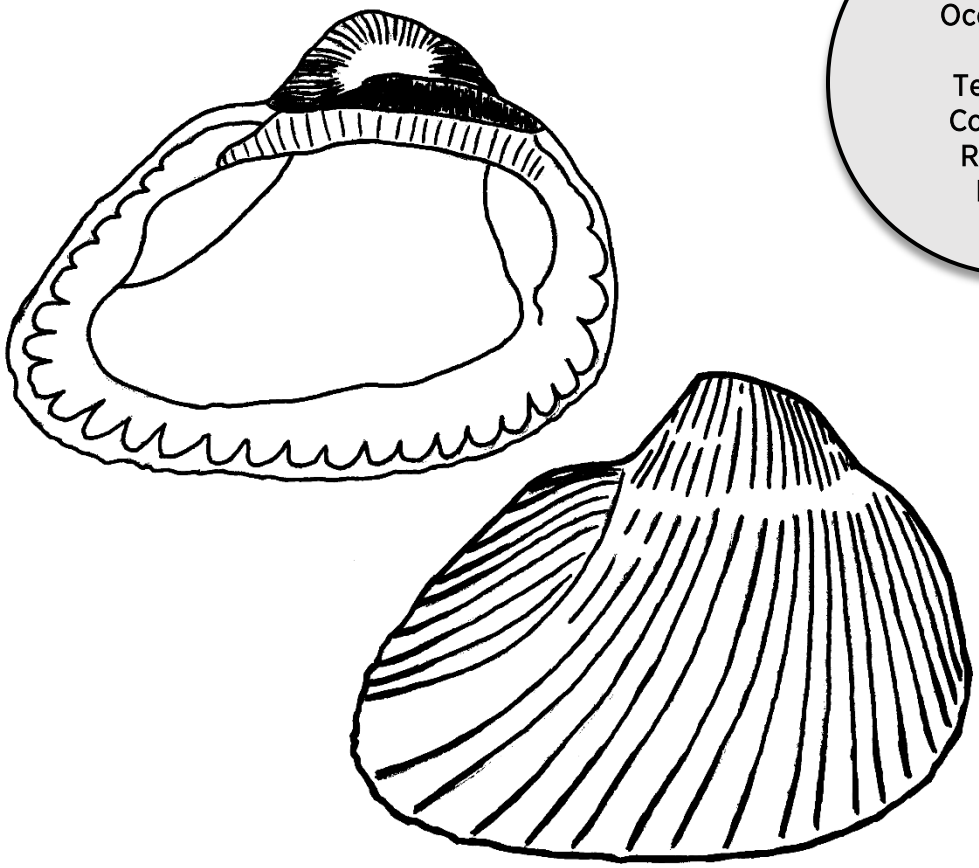
Word Bank
Valve
Hinge
Radial
Siphons
Concentric
Tentacles
Foot

The Quahog Clam, also called a Hard Clam, is a bivalve with two thick, equal-sized shells joined together by a _____. The outside of the shell is marked with _____ (circular) growth rings and is tan to off-white in color with reddish markings. The inside of the shell is white to light yellow in color with dark purple around the edges. There can also be a dark purple muscle scar. The Quahog Clam is a filter feeder and uses a pair of _____ to trap microscopic organisms from the surrounding water. The Quahog Clam also uses its strong _____ to bury itself in the ocean sediment to hide from predators.

A lot of Quahog Clams have been found at Pockoy. Some are whole, but many are in pieces. Archaeologists have also found circular beads made from Quahog Clam shell.

What do you think the Quahog Clam was used for at Pockoy?

Ark Clam (*Arcidae*)



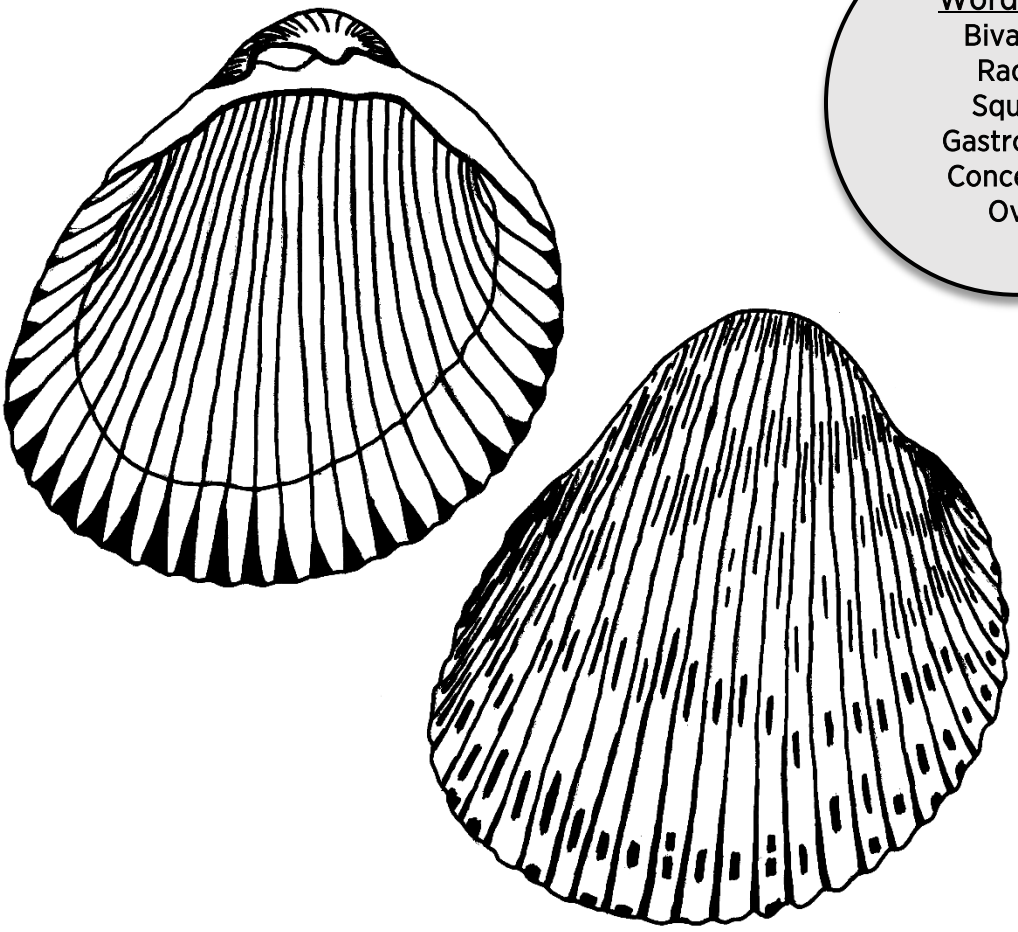
Word Bank
Ocean Floor
Radial
Terrestrial
Concentric
Riverbed
Marine

The ark clam is a large family of _____ bivalves with nearly 200 different species. With that many members, ark clams come in all kinds of sizes, shapes, and colors, but all ark clams have thick, heavy, squarish shells with _____ (ray-like) grooves. Most ark clams like to live on the muddy _____ in the low intertidal zone. In South Carolina, some common species of ark clams are the Ponderous Ark (*Noetia ponderosa*), the Blood Ark (*Lunarca ovalis*), and the Incongruous Ark (*Scapharca brasiliana*). The Blood Ark gets its name because of the hemoglobin in its blood, giving the mollusk a bloody red color.

Many ark clams were found in the shell ring at Pockoy. Some ark clams were still articulated, meaning the two halves to their shell were still joined together.

What do you think the ark clam was used for at Pockoy?

Cockle Clam (Cardiidae)



Word Bank
Bivalves
Radial
Square
Gastropods
Concentric
Oval

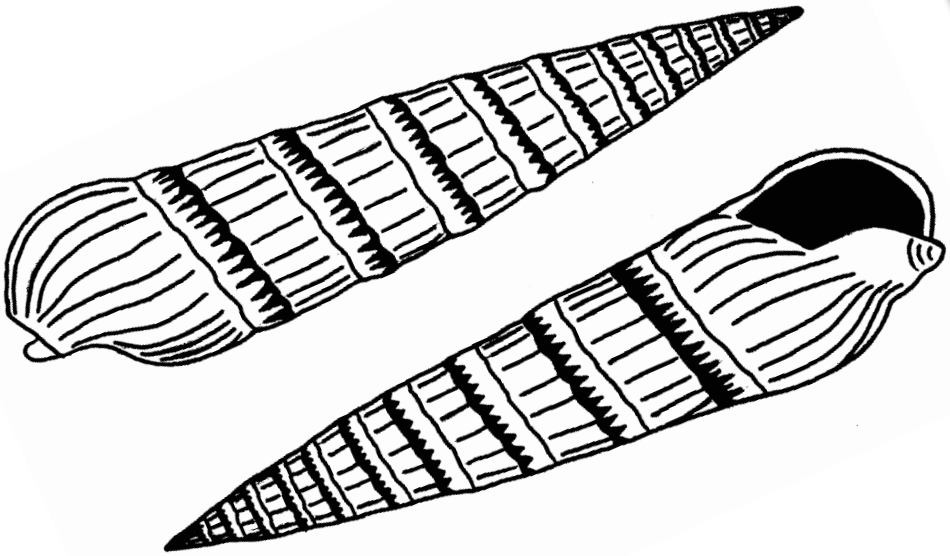
Like the ark clam family, the cockle family is a large group of marine _____ with around 200 different species. Like ark clams, cockles can be quickly identified by their _____ grooves, but cockle shells are more _____ shaped than the shells of ark clams. Cockles like to live on the muddy, sandy ocean floor just off the coast, where the water protects them from predators, like the seagull. Their shells are strong and compact, which helps cockles survive getting tumbled around in the surf. In South Carolina, a common species of cockle is the Atlantic Giant Cockle (*Dinocardium robustum*).

Cockles were found at Pockoy alongside ark clams, but in far fewer numbers. Like the ark clam, some cockles were also found still articulated.

What do you think cockles were used for by the people who made the shell ring on Pockoy Island?

Common Atlantic Auger (*Terebra dislocata*)

<u>Word Bank</u>
Radula
Tentacle
Shallow
Deep
Whorl
Groove
Knob



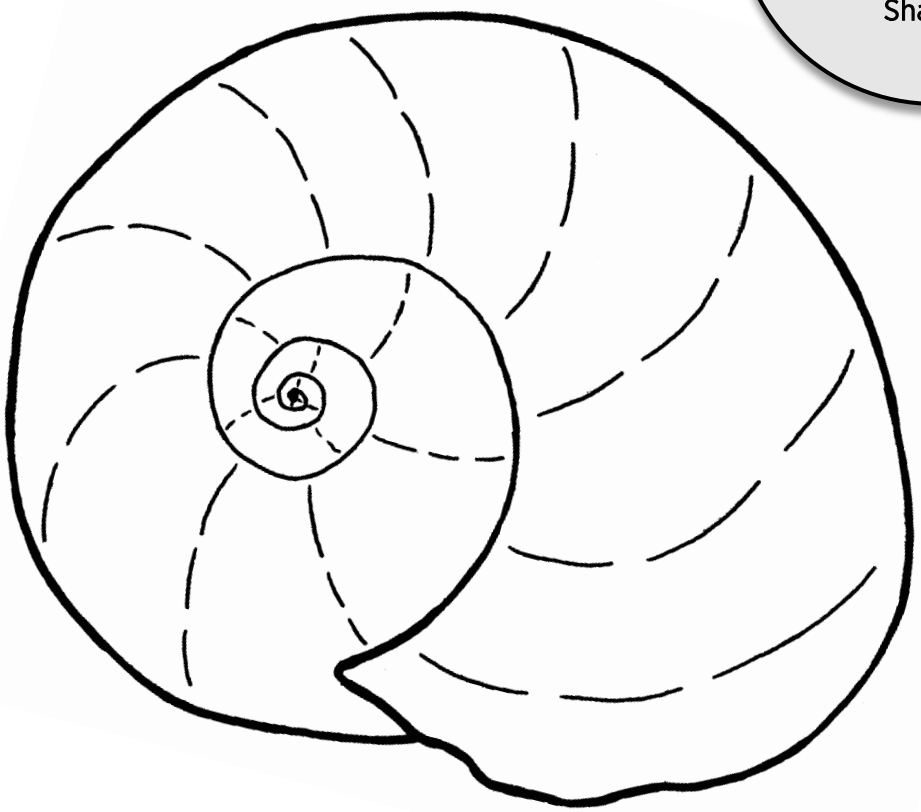
Augers are carnivorous gastropods with long, slender, pointy shells. Their shells range in color from off-white to different shades of gray and brown. An auger's shell grows to about 1 ½ to 2 inches in length with nearly fifteen _____ (spirals or turns of the shell). Augers like to live in _____ water around the intertidal zone and on sandy beaches. In South Carolina, a local species of auger is the Common Atlantic Auger. The Common Atlantic Auger is a carnivore, but it does not have a _____ (harpoon-like tooth) like most other augers. Instead, the Common Atlantic Auger buries itself under the sandy ocean floor where it preys on marine worms.

Occasionally, auger shells were found in the shell ring on Pockoy Island, but in far fewer numbers compared to clams, whelks, arks, and oysters.

How do you think augers and their pointy shells were used at Pockoy?

Atlantic Moon Snail (*Neverita duplicata*)

<u>Word Bank</u>
Aperture
Carnivorous
Deep
Herbivorous
Apex
Shallow



Also called a “shark eye”, the Atlantic Moon Snail is a _____ gastropod that eats bivalves by drilling small holes into the bivalve’s shell. The moon snail’s shell has about four to five whorls and is gray to tan in color with blue tinges. The blue color around the shell’s _____ (pointed tip) causes the shell to resemble an eye, earning the snail its nickname. Moon snails like to live on sand in _____ water, around the low tide line. Empty shark eye shells are popular homes for hermit crabs and their shells also provide a hard surface for other marine organisms to attach to, like barnacles.

Occasionally moon snail shells were found in the shell ring at Pockoy, but in far fewer numbers compared to whelks, clams, arks, and oysters.

What do you think moon snails were used for at Pockoy?