

## Snail Shell Science: A Whelk-ome Activity

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**\*\*\*Note: Figures may be missing from this format of the document**

Over the last decade, I have discovered that all students— especially those who live in landlocked environments— are fascinated by items from the sea. One such item that few students are familiar with is a whelk egg case. On a typical walk along the southeastern Virginia coast, whelk egg cases can be found laying half-buried in the high sand or exposed on the still-damp sand near the low tide's edge. Over the years, I have collected whelk egg cases and used them in numerous inquiry-based labs. I would like to share a few with you that I hope you will "whelkome" into your classroom.

### LESSON ONE OBSERVATION

Begin this activity by holding up a single string of egg cases. After students have had the chance to examine "the object" for a few minutes, ask them to share their observations. Record their comments on the blackboard or overhead, and group the responses into "senses" categories. Students may also have a multitude of hypotheses concerning the origin of the object. (Dried banana slices, exotic dried vegetables or sea plants, and rattlesnake tails are some of the preliminary identifications that my students have suggested.) These should be noted alongside their observations. As more data is collected, invalid hypotheses can be identified and discarded.

Next, hand each student or pair of students their own string of egg cases and ask them to elaborate on their previous descriptions. Usually, someone in the group will shake the egg cases and small shells will tumble out. At this point, suggest that each group carefully open one section or disk (egg case). During this phase of the exploration, lasting from 15 to 25 minutes, suggest that students categorize their findings and count the number of shells in each egg case. Encourage the students to continue to make observations. Students are quite excited about the object and continue to hypothesize about what these objects might be. Students may suggest that the object is a plant that snails enter and lay their eggs on, or that it is some type of maternity ward. Others may conclude that the cases are the digestive system of a snail-eating animal or the remains of a carnivorous plant.

Encourage students to wander purposefully around the room to examine the contents of other disks. There are great differences in size, color, and number of shells from the various egg cases. Stop and share additional information and ideas about the identification of "the object." Many students are convinced that the egg cases are seed pods or some other plant parts (maybe air bladders from sea weeds) and that snails enter these pods to lay eggs. Or, they suggest that the snails feed on these plant parts. Students offer creative hypotheses to explain these sea shell maternity wards.

### LESSON TWO: IDENTIFICATION

At the start of this activity, display some adult whelk specimens. Ask students to try to match babies and adults. Stress the importance of careful, detailed observations that allow accurate identification. Students frequently refer to color differences and nuances in the general shape of the shell. Occasionally, students will notice the difference in the spiraling among whelks. Most whelks are right-handed, but the lightning whelk is usually left-handed. Hold the whelk with the aperture facing you. If the opening is to the right of the apex, then the whelk is said to be right-handed. If the opening is to the left of the apex, then the whelk is said to be left-handed (see Figure 1). Students can use "handedness" to pair young with adult specimens. Sometimes a species will have individuals that exhibit either handedness, although usually one handedness is more common than the other.

Following this matching activity, whelk lifestyles can then be discussed. Using several reference books, students identify the adult whelk types and note any interesting facts about specific whelks or whelks in general (see Figure 2). This information should be shared with the class. Students should also try to answer the following questions during the research segment of the activity.

**FIGURE 2.** Fascinating facts about snails and whelks.

- The study of shells (including snails and, therefore, whelks) is called conchology. Conchology, from the English, once meant the study of mollusks, but has now been popularized to mean the study of shells by amateurs.
- All whelks are snails and all snails are mollusks.
- There are more than 70 000 kinds of living mollusks, and perhaps twice this number of species in previous geological times.
- There are over 30 000 species of univalve mollusks, including the snails, periwinkles, and conchs.
- Mollusks (from the Latin *mollis*, meaning soft-bodied) produce shells of calcium carbonate as outer skeletons.
- A mollusk has a covering on its body called a mantle. This mantle resembles a cape (or mantle) that people sometimes wear. The mantle lines the shell of all mollusks and contains the glands that secrete calcium carbonate, the shell-building material.
- The lime to build their shells (or exoskeletons) is found in the foods they eat or the waters that surround them.
- The study of how a special group of univalve mollusks grow, breed and defend themselves, malacology, from the French, is a term now commonly associated with the scientific study of whelks.
- Whelks are mollusks with one shell (univalves). All whelks are mollusks but not all mollusks are whelks. The drawing below identifies the main parts of a whelk shell.
- Whelks are types of snails or gastropods, meaning stomach-foot, because they appear to travel using their stomach as a foot.
- Whelks have a ribbon-like set of hooked teeth called radula (found only in mollusks) that they rasp back and forth over food— the way a cat uses its tongue to lap milk.
- Most snails are hermaphrodites (one individual has both male and female sex organs). Whelks are not. The female whelk has a slightly larger shell than the male whelk.
- Whelks have gills.
- Young whelks may eat their way out of the egg capsules or may eat younger brothers and sisters until only one large individual is left in the egg capsule.
- Whelks eat live oysters, dead fish, crustaceans, putrefying mollusk meat, and decaying vegetable matter.
- Most whelks are carnivorous; some bore holes in living bivalves or other snails and feed on the meat inside.
- Whelks usually live from two to five years, but some live for decades.
- Knobbed whelks live in shallow water and eat clams. Whelks uproot clams from the sand, enwrap them in their large muscular foot, and pry the valves apart.
- *Busycon* whelks were used by American Indians to make white wampum. Wampum was first used for ornamentation, then to record treaties and other transactions and finally as currency.

- Do you think that this object is or was once alive?
- Do whelks live in all oceans?
- How many whelks come from one egg sack?
- What do whelks eat?
- How are egg cases released from the females?
- How do the young free themselves from the egg cases?
- How does the egg case protect the young?
- How long do whelks live?
- How long does it take the whelk eggs to hatch?
- How long is it before the miniature snails leave their egg capsules?
- How often do whelks lay eggs?

From their readings, students will learn that knobbed and channeled whelks lay long ribbons of egg capsules resembling oversized rattlesnake tails. Each capsule, approximately the size of a quarter, contains either hundreds of pin-sized eggs or dozens of hatched miniature whelks. They should also note that *Busycon* whelks lay wafer-shaped, leathery capsules attached by a cord in a snakelike row, and that each capsule may contain 50 to 120 miniature snails. When they come across this information, they should realize that "the object" has been positively identified as a whelk egg case.

### LESSON THREE: CLASSIFICATION

Assuming that students have some background in binomial nomenclature and biological classification, review a classification scheme. The lightning whelk would be classified as follows:

- Kingdom—Animalia (multicellular invertebrate and vertebrate species)
- Phylum—Mollusca (snails, clams, oysters, periwinkles, scallops, squid, octopuses, slugs and whelks)
- Class—Gastropoda (Subclass Prosobranchia: gills are located in a mantle cavity at the front of the animal, most are aquatic)
- Order—Neogastropoda
- Family—Melongenidae (whelks)
- Genus—*Busycon*
- Species—*contrarium* or *sinistrum*

The adult whelks can be used for classification exercises to design a key or to identify whelks using other available keys. The collection of whelks that I use includes four different members of the same genus, *Busycon*. Among these four types of whelks, there are three different species and one subspecies. The Latin names for these four different whelks are provided in Figure 3. Students can design a key using their own set of characteristics or they can use the sample key in Figure 4.

### COLLECTING YOUR CASES

If you or someone you know is planning a trip to the shore this summer, adult whelk shells can be purchased from gift stores all along the Atlantic coast. Whelk shells can also be purchased from biological supply houses. Egg cases, unfortunately, may be more difficult to obtain. I would be interested, however, in trading local items of interest (such as fossils) for whelk egg cases. (Contact me at the address provided below.)

**FIGURE 4.** Whelk key.

1A. Right-handed whelks.....	go to 2A
1B. Not right-handed whelks.....	Lightning whelk
2A. Knobbed spirals.....	go to 3A
2B. Not knobbed spirals.....	Channeled whelk
3A. Pronounced knobs.....	Kiener's whelk
3B. Not pronounced knobs.....	Knobbed whelk

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