Mussel ID

Adapted from: An original Creek Connections activity.
Creek Connections, Box 10, Allegheny College, Meadville, PA 16335

Grade Level: Basic, intermediate, or advanced

Duration: 20-45 minutes

Setting: Classroom

Summary: Students identify various types of mussels from the French Creek Watershed.

Objectives: Students will be able to identify many common mussels from French Creek.

Vocabulary: Anatomy, Anterior, Beak, Beak Cavity, Dorsal, Growth lines, Interdentum, Lateral hinge teeth, Muscle Scars, Nacre, Pallial line, Periostracum, Posterior ridge, Posterior, Pseudocardinal teeth, Rays,Ventral.

Related Module Resources:
- Mussel Reference Collection Boxes.
- Fact sheet from French Creek Project: Freshwater Mussels
- Freshwater Mussels Fact Sheets by The French Creek Project
- Mussels Found in the French Creek Watershed Laminated Guides

Materials (Included in Module):
- Mystery Mussel Sheets
- Mussel ID Data Sheets
- Mussel Reference Collection boxes

Additional Materials (NOT Included in Module):
- Dry erase marker, overhead projector

ACADEMIC STANDARDS:

(ECOLOGY AND ENVIRONMENT)

7th Grade

3.3.7.A. Describe the similarities and differences that characterize diverse living things.

4.1.7.D. Explain and describe characteristics of a wetland.
- Recognize the common types of plants and animals.

4.3.7.C. Explain biological diversity.
- Explain the complex, interactive relationships among members of an ecosystem.

4.7.7.A. Describe diversity of plants and animals in ecosystems.
- Select an ecosystem and describe different plants and animals that live there.

10th Grade

4.1.10.C Describe the physical characteristics of a stream and determine the types of organisms found in aquatic environments.
- Identify terrestrial and aquatic organisms that live in a watershed.

4.3.10.C Explain biological diversity as an indicator of a healthy environment.
- Explain species diversity.
- Analyze the effects of species extinction on the health of an ecosystem

12th Grade

4.6.12. A. Analyze the interdependence of an ecosystem.
- Understand how biological diversity impacts the stability of an ecosystem.

4.7.12. A. Analyze biological diversity as it relates to the stability of an ecosystem.
- Examine and explain what happens to an ecosystem as biological diversity changes.
- Explain the relationship between species' loss and bio- diversity.

(SCIENCE AND TECHNOLOGY)

7TH Grade

3.3.7.A. Describe the similarities and differences that characterize diverse living things.
- Explain how to use a dichotomous key to identify plants and animals.

10th Grade

3.3.10.A Explain the structural and functional similarities and differences found among living things.
- Identify and characterize major life forms according to their placement in existing classification groups.
- Describe organizing schemes of classification keys.
- Identify and characterize major life forms by kingdom, phyla, class and order.

BACKGROUND:

A mollusk is any one of a group of animals having no backbone (invertebrate), soft bodies not composed of segments, are usually covered with a hard shell of one or more parts. A mussel is a type of mollusk with two outer shells hinged together (bivalve). The purpose of the shell is to protect the sensitive internal organs that comprise the living animal. The shells of bivalves are usually slightly open, but when the animal is frightened, strong muscles pull the shells shut and hold them closed until danger has passed.

Freshwater mussels have been important to humans since the Native Americans began populating North America. Historically, mussels were a source of food and their shells were used for making utensils, tools, and jewelry. In the late 1800's they were harvested to make mother-of-pearl buttons. However, after the wide spread use of plastic buttons, mussels populations were given a chance to recover.

Beyond having economic significance, freshwater mussels are important to the life of a stream. Animals such as muskrats, fishes, and some birds feed on clams. Also, mussels filter the water for the benefit of all organisms.

Mussel identification relies on the fact that all mussels, indeed all living things, can be divided into categories based on their characteristics. These categories, or taxonomic ranks, form a hierarchy of classification. The major taxonomic ranks are as follows, proceeding from the higher, more inclusive ranks to the lower, less inclusive ones: kingdom, phylum, class, order, suborder, family, subfamily, genus, and species. A **taxon** or taxonomic name is a name used for a group of naturally related organisms. A taxon may be used for a group at any taxonomic rank. For example, the pocketbook, wavy-rayed lampmussel, and fatmucket represent specific members of *Lampsilis*, a taxon recognized as a genus. The name maple is a common name that varies among languages and in regional usage. *Lampsilis* is an internationally accepted scientific name based on rules of nomenclature. Scientific names most often have Latin or Greek derivatives. Basing the scientific naming process on a neutral language enables scientists around the world to have a common understanding of a single organism.

A **binomial name** (or two-name name) is used for the scientific name of a species. It is composed of the name of the genus to which the organism belongs, followed by its species name. The genus name is capitalized, while the species name is not; both names are italicized. For example, *Lampsilis siloquoidea* is the scientific name for the Fatmucket

In this activity, we will focus on identifying numerous mussels from Pennsylvania's waterways.

OVERVIEW:

Students work in groups to identify Mussel shells using field guides and/ fact sheets. Students then present their mussels to the class, stating the common and scientific names and the characteristics that were most useful for identification purposes.

PROCEDURE:

Teacher Preparation:

1. Make copies of the "Mussel ID Data Sheet" for all of your students.

2. Locate the Mussel field guides and fact sheets in the module.

Student Activity:

1. Have students imagine that they are planning to restore the mussel population of a stream in their community. They are trying to decide what type of mussels to place in high flow, which would be in the middle of the stream, and which to place in the low flow on the edge of the stream. They just visited an intact populated stream and collected mussels throughout the stream but forgot to separate them by habitat and have not yet identified the mussels.

2. Have students brainstorm the types of mussel characteristics that would be helpful when identifying mussels and generate a list on the board. Use this as an opportunity to introduce students to the mussel terminology they will encounter when identifying mussels e.g., **nacre**, **beak**, **rays**, etc.

3. Divide the class into groups and distribute an equal number of mussel shells and descriptions to each group. Each group should also receive a Fact sheet from French Creek Project: Freshwater Mussels, a Freshwater Mussels Fact Sheet by The French Creek Project and a Mussels Found in the French Creek Watershed Laminated Guide.

4. Have students use their field guides to identify the mussels to which the shells belong. Each mussel shell is numbered. There is additional information on the " Mussel ID Data Sheets" next to the number corresponding to the number on the mussel shell to help students correctly identify their mussels. Have students use this information and their observations of the shells themselves to identify the mussels. Have students record their guesses (common name and scientific name) on their "Mussel ID Data Sheets" next to the corresponding number.

5. Have students prepare to present their mussels to the class, mentioning the common and scientific names of each and describing what characteristics were most instrumental in helping them identify each mussel. They should also read the information under habitat preferences on their Data Sheets so that they can correctly place their mussel the stream.

6. Have each group present their mussels. Have the "Stream Flow Gradient" overhead transparency projected so that students can write the names of their mussels in an appropriate location on the gradient at the end of their presentation of each mussel shell. Use a dry-erase marker to write on the overhead transparency.

DISCUSSION:

Which mussels were easiest to identify? Most difficult?
Allow students to respond.

What resource was most helpful in identifying the mussels?

How many different kinds of mussels did we identify today? What is the scientific term for "many different kinds of living things"? *Count the number of mussel species identified. Biodiversity.*

If you were going to restore a mussel population, which mussels would you place in the slow flowing areas? In high flow conditions? *Refer to the location of mussels along the Stream Flow Gradient.*

What would happen if you accidentally planted invasive species? *They might outcompete the native species and potentially lead to the local extinction of some of these native species.*

EVALUATION:

- Name four shell characteristics that are used to identify mussels.
- Select several "mystery" mussels from the reference collection and have students use their field guides to correctly identify them.
- Give students various scientific mussels names and have them identify which word refers to the genus and which word refers to the species.

EXTENSIONS AND MODIFICATIONS:

- Instead of using the reference collection, allow the students to work on the Mystery Mussel Identification sheets.
- Visit a local stream and use the field guides to identify the mussels there. Have students create diagrams mapping the prevalence of different mussel species at different distances in the waterway. Compare these findings to those of the main "Mussel ID" activity. You may want to invite a biologist to assist your class in the field.

- Have students investigate the biology of why some mussel species are more or less suited for different flow conditions.
- Mussel Parts and Pieces would be a good activity to start with before this activity. In the Mussel Parts and Pieces activity, students identify and learn the names of certain parts of a mussel shell. This may help during identification in this activity.

NOTES (PLEASE WRITE ANY SUGGESTIONS YOU HAVE FOR TEACHERS USING THIS ACTIVITY IN THE FUTURE):