

## 5E Lesson Plan

**Center:** The River Center

**Program Name:** Squid Dissection Lab

**Date Offered:** Year-round

**Subject / Grade Level:** Science / 5<sup>th</sup>

### Materials:

Teacher

- Research Material for Cephalopods
- Computer
- Giant Squid resources and references
- Projection screen

Student

- Journal
- Pencil
- Computer access

### NGSSS Benchmark:

#### Grade 5 Science Standards

SC.5.N.1.2: Explain the difference between an experiment and other types of scientific investigation.

SC.5.N.1.6: Recognize and explain the difference between personal opinion/interpretation and verified observation.

SC.5.L.14.2: Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support -- some with internal skeletons others with exoskeletons while some plants have stems for support.

SC.5.L.15.1: Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.

SC.5.L.17.1: Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.

SC.5.P.13.1: Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects.

#### Grade 5 Language Arts and Mathematics Standards

LAFS.5.RI.1.3, LAFS.5.RI.2.6, LAFS.5.RL.2.6, LAFS.5.SL.1.1, LAFS.5.SL.1.3, LAFS.5.W.3.8, MAFS.5.MD.2.2

### Vocabulary:

Dissection, scientific examination, taxonomy, kingdom, phylum, class, Mollusca, Cephalopoda, dorsal, ventral, tentacle, funnel, mantle, anatomy, gonad, ink sac, siphon, beak, appendage, chromatophore, predator, prey, marine, species, aquatic, river, ocean, estuary, bi-valve, gastropod, eye lens, jet propulsion, water vascular system, gills, pen/shell

### Lesson targets:

- I can perform a scientific dissection on a squid.
- I can classify squid using a taxonomy chart.
- I can identify the anatomy, characteristics, and adaptations of squids.
- I understand why squids are important.

**Differentiation strategies to meet the needs of all students:**

- Use of visuals
- Hands on activities
- Working in a group setting
- Use of open-ended questions
- Relate topic to their everyday life
- Tutor/Peer buddy activities

**Background:**

There are more than 300 species of squid which are 10-armed cephalopods classified within the order Teuthida and found in both coastal and oceanic waters. Squids have elongated tubular bodies and short compact heads. Two of the 10 arms have developed into long slender tentacles with expanded ends and four rows of suckers with toothed rings. The body of most squids is strengthened by a feather-shaped internal shell. Squid eyes are almost as complex as human eyes and are usually set into the sides of the head.

Little is known of the life history of squids. Some attach their eggs to floating weeds and others to the ocean bottom. In some species the young resemble the adults at hatching, while in others have a planktonic larval stage. Squids are numerous in the sea and serve as food for many animals including the sperm whale, bony fishes, and human beings.

**Engage:** (To be completed prior to the River Center field trip)

1. Have students gather information on the natural history and diversity of mollusks, cephalopods, and in particular squids. Learn about the life cycle and different species found throughout the world. There are hundreds of species of cephalopods ranging in length from three-fourths of an inch to the 60-foot giant squid.
2. In Search of... The Giant Squid!!!!
  - a. Have students use the web and other sources to track the adventure of marine scientists trying to learn more about giant squids.
  - b. Have your students create a fictional journal about the activities, technologies, and adventures common to squid research.
  - c. Be sure they include a page imagining the day on which scientists finally discover a live giant squid.
3. Share their journal experiences with the class.
  - a. What technology did you invent to help find the giant squid?
  - b. What was its behavior? What was it doing?
  - c. What did it look like?

**Explore:** (Completed during visit with River Center staff)

1. Welcome, introduction to the River Center, overview of today's field trip, and safety/rules talk
2. Divide the students into 2 groups to rotate through 3 different activities
  - a. Lovin' the Loxahatchee River Tour – focusing on Mollusks, adaptations, and habitats
  - b. Squid Dissection Lab (See below)
  - c. Water resources discussion – Where our water comes from, how we use water, where it goes once down the drain, water conservation
3. Aquarium fish feeding from the dissected squid

**Explain:** Squid Dissection Lab Main Lesson (Completed during visit with River Center staff)

- Students will work in pairs performing a scientific dissection of a squid.
- Students will learn the classification of squid, their characteristics, and adaptations.
- Students will use dissection tools to identify different organs of the squid including mantle, fins, eye lens, arms, tentacles, beak, gills, ink sac, shell, or pen, etc.
- Students get the opportunity to watch their dissected squid be used as food for the River Center's aquarium species.

**Elaborate:** (Completed in classroom after visiting)

What is 60 feet long from the tips of its long arms to the top of the mantle, has eyes the size of volleyballs, and has only been seen alive on camera in its deep-sea habitat since 2012? The incredible giant squid! Most of us know the giant squid only through novels and science fiction movies. Scientists know them from carcasses washed up on shore, floating in the sea, hauled up in fishing nets, or as remains found in the stomachs of their main predator the sperm whale. They have been recently recorded in photographs and videos.

- Have your students read and analyze ancient myths, contemporary fiction, and movies about giant squids.
  - How do these sources characterize this rare creature?
  - Do you think these accounts are accurate?
  - What was your favorite myth or legend you found in your research?

**Evaluate:**

- Write about your experiences at the Loxahatchee River Center.
- Grade assessment and participation of the pre and post activities described in the Engage and Elaborate sections.
- Grade assessment on vocabulary and squid anatomy.
- The teacher will observe and guide the students to assess their own learning.

### **Making STEM Connections: Squid Dissection Lab**

#### Science

- See standards above.

#### Technology

- Watch the River Center's Science with Sam two-part series on Animal Adaptations. Research physical, behavioral, and environmental adaptations and design the ultimate predator that also can be avoid being prey.
- Science with Sam Volume 9: Animal Adaptations Part 1  
<https://www.youtube.com/watch?v=kEAy7fxh8G8&list=PLA39R2PcEo32OY-s6Wp9bJE3ysTXj-Dqq&index=9>
- Science with Sam Volume 10: Animal Adaptations Part 2  
<https://www.youtube.com/watch?v=ngdh6Twq3mc&list=PLA39R2PcEo32OY-s6Wp9bJE3ysTXj-Dqq&index=10>

#### Engineering

- Research Team Orca's efforts in deep-sea exploration. Identify the technology that makes these studies and findings possible. See how they use bioluminescence, stealth cameras, and deep-diving submersible to learn about our oceans.

#### Mathematics

- See standards above.

**Resources:**

- The Search for the Giant Squid by Richard Ellis. Penhuin, 1999
- In Search for the Giant Squid (Smithsonian Institute) <http://ocean.si.edu/giant-squid>
- National Museum of Natural History [http://www.mnh.si.edu/exhibits/ocean\\_hall/squid.html](http://www.mnh.si.edu/exhibits/ocean_hall/squid.html)
- Giant Squid video [www.teamorca.org](http://www.teamorca.org)
- Cephalopods: <http://www.bbc.co.uk/nature/life/Cephalopod>
- Humboldt Squid: [http://www.bbc.co.uk/nature/life/Humboldt\\_Squid](http://www.bbc.co.uk/nature/life/Humboldt_Squid)
- Common Cuttlefish: [http://www.bbc.co.uk/nature/life/Common\\_Cuttlefish](http://www.bbc.co.uk/nature/life/Common_Cuttlefish)
- Octopuses: <http://www.bbc.co.uk/nature/life/Octopus>
- Nautilus: <http://www.bbc.co.uk/nature/life/Nautilida>
- Edith Widder TED talks
  - How we discovered the giant squid
  - The weird, wonderful world of bioluminescence
  - Glowing life in an underwater world

**Making Loxahatchee River District Connections:**

- Solid waste
- Sewage

**Making River Center Exhibit Connections:****Oyster Reef Exhibit**

- Comparing and contrasting the different species found within the Phylum Mollusca: Class Cephalopoda (squid) versus Bivalvia (oyster)
  - Feeding – active carnivorous predators versus filter feeders
    - Comparing potential pollutants found within their bodies
      - mercury and microplastics levels – Based on their feeding behaviors, you would expect to see higher levels of mercury in squid versus microplastics in oysters.
      - Bioaccumulation/Biomagnification
      - If treated/reclaimed wastewater is released back into the river with microplastics or microfibers in it, would that affect oyster health?
  - Movement – water propulsion versus sessile benthic organisms
  - Habitat – Ocean marine species versus brackish estuary species
  - Body shape, characteristics, and adaptations

**Dock Piling and Coral Reef**

- Positive and negative influences on the river and ocean by human actions
- Point and non-point pollution sources
- Pollution in the river and on the reefs that can affect the health of marine animals including squid species.