



## South Florida Science Museum Squid Dissection Program Curriculum

### PROGRAM DESCRIPTION

Dissection labs are designed to give students a hands-on approach to learning about anatomy, both externally and internally of various animal groups. Squid dissections allow students to discover the structures and functions of the collection of animals known as the mollusks. Hand-outs, equipment, and specimens are all provided by the Museum. After having the chance to dissect a squid, students will be able to compare and contrast their body systems to ours.

### SUNSHINE STATE STANDARDS

- SC.6.L.15.1: Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
- SC.6.L.14.5: Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.

### MATERIALS

- Dissection Trays
- Squid specimen (1 per 2 students)
- Dissection tools (scissors, forceps, Probe)
- Gloves
- Anatomy worksheets

### VOCABULARY

Mollusk - invertebrate having a soft unsegmented body usually enclosed in a shell

Invertebrate - an animal, such as an insect or mollusk, that lacks a backbone or spinal column

Gastropod - a class of mollusks typically having a one-piece coiled shell and flattened muscular foot with a head bearing stalked eyes (snails)

Bivalve - a mollusk, such as an oyster or a clam, that has a shell consisting of two hinged valves

Cephalopod - marine mollusk characterized by well-developed head and eyes and sucker-bearing tentacles (squid, octopus, cuttlefish)

Mantle - a single or paired outgrowth of the body wall that lines the inner surface of the valves of the shell in mollusks and brachiopods

Dorsal – situated on or toward the upper side of the body, equivalent to the back, or posterior, in humans

Ventral - situated on or toward the lower, abdominal plane of the body; equivalent to the front, or anterior, in humans

Chromatophores – a pigment-containing or pigment-producing cell that by expansion or contraction can change the color of the skin

Tentacle - a narrow, flexible, unjointed part extending from the body of certain animals, such as an octopus, jellyfish, or sea anemone; used for feeling, grasping, or moving

Siphon - a projecting tubular part of some animals, esp. certain mollusks, through which liquid enters or leaves the body

Gills – the respiratory organ of most aquatic animals that breathe water to obtain oxygen

Hermaphrodite – an individual in which reproductive organs of both sexes are present

## **SCRIPT**

Good morning, everyone! I'm Ms./Mr. \_\_\_\_\_ from the South Florida Science Museum and today we are going to do a squid dissection lab. You will be working with a partner, the person sitting next to you. In your tray in front of you, you should see a pair of scissors, a pair of forceps (look like tweezers), and a probe.

What do you guys know about squid already?

\*What **FAMILY** do they belong to? MOLLUSKS

-same as octopus, clams, oysters, conch

What are characteristics of mollusks?

-soft body

-most have a shell

\*look at your squid: does it look like it has a shell? No, but we'll be taking a look at a part of them that scientists believe could have been part of a shell at one point in time

-invertebrates

\*what does that mean? No backbone

\*\*NOT tentacles! Not all of them have tentacles\*\*

3 groups of mollusks:

### 1) Gastropods

- a. Gastro = stomach; pod = foot ~~~~~> "stomach footers"
  - i. Use a muscular foot to move along the bottom (ex: conch)

### 2) Bivalves

- a. Bi = 2 ~~~~~> has 2 parts (hard shell & siphon)
- b. Doesn't move well
- c. Filter feeders (ex: scallops, clams, oysters)

### 3) Cephalopods

- a. Ceph= head ~~~~~> "head footers"
- b. Siphon used for locomotion instead of filter feeding (like in bivalves)
- c. Ex: SQUID

Use your worksheet to help you

### 1) Find the MANTLE

- a. Ever eat calamari? This is the part you're eating ~ what they take the small rings from
- b. Protects the internal organs
- c. Takes up  $\frac{3}{4}$  of the squid's body

### 2) Check out the **COLOR** of your squid

- a. Is it the same color on both sides?
- b. What color is it? Is there a pattern?  
\*More on the dorsal side (top = black), then on the ventral side (bottom = pink)

\*Spots = **CHROMATOPHORES**

\*Why would these chromatophores be important?

- camouflage (they can adjust the shade)
- communication (deep water squid can display light through them to communicate)

- 3) Does your squid have fins?
- a. 2
  - b. Attached to the dorsal side
  - c. What do they need these for?
    - i. Guide them in the right direction and give them balance (so they don't roll over)
    - ii. Think of them as a rutter on boats
- 4) How many **TENTACLES** do your squids have?
- a. 2
  - b. What's their purpose?
    - i. Longer and thinner with hooks at the end to grasp prey
- 5) How many **ARMS** do your squids have?
- a. 8
  - b. What's their purpose?
    - i. Have suction cups going all the way down to hold onto struggling prey
- 6) Do your squids have teeth?
- a. NO
  - b. Have a **BEAK** just like a parrot
  - c. These beaks are very small
    - i. Giant squid = beak size of grapefruit
    - ii. Colossal squid = beak size of soccer ball
    - iii.

\*Beak dissection\*

- ~Hold squid like a banana (one partner)
- ~Pull back arms and tentacles
- ~In the center, little black dots
- ~Use forceps to pull it out (other partner)
- ~Beaks have 2 parts to them – so you may pull half out, then have to pull the second half out

- 7) Take a look at their **EYES**
- a. Pretty large in relation to its body
  - b. What color are they? Dark
    - i. Why do you think it'd be beneficial for squids to have dark eyes?
      1. absorb more light
      2. help them see in deep, dark waters
  - c. Do you think squids have good vision or poor vision?
    - i. GOOD
    - ii. Have complex vision thanks to their lens

\*Dissect the eye & remove the lens\*

- use scissors
- 1 partner squeeze the bottom of the eye
- 1 partner give it one snip, holding the scissors directly above the eye
- BE CAREFUL! 1<sup>st</sup> snip is juicy
- use fingers to reach in there and squeeze the gunk out
- feel through it and feel for a tiny, pearl-colored marble

- 8) Make sure the VENTRAL (pink) side is facing up and take a look at the **SIPHON**
- a. Bivalves use siphon to collect food, Squids use siphon to move
  - b. They fill their mantle cavity with water and force it out the siphon
  - c. Fleshy tube
    - i. Part of it is under the mantle
  - d. Take probe and put through it
  - e. So what way do they swim? BACKWARDS
  - f. Why wouldn't they swim the other way?
    - i. Arms/tentacles would create drag
    - ii. What do they do when they feel threatened? INK
      1. So when they would release their ink into the water at predators, they'd just be swimming right into it

Leave the belly side (pink/ventral) up – flip worksheet to INTERNAL

One person pinch mantle (huge air cavity – can fit finger in it)

One person cut up the body (with wide side of scissors on bottom, pointy side up)

should open like a book

- 1) Locate **RETRACTOR MUSCLES**
  - a. Pull up probe (from where it's still in siphon)
    - i. 2 pouches next to it
  - b. Contract the siphon ~> helps them move
- 2) The small silver sac in between the retractor muscles = **INK SAC**
  - a. Don't rupture it if it hasn't already been ruptured
- 3) Underneath the retractor muscles and ink sac = **STOMACH**
  - a. Yellowish
  - b. Digestion ~> prey is broken down and absorbed into squid's body
- 4) **GILLS**
  - a. Clear, jelly-like material attached to the sides
  - b. Why can't animals with gills breathe out of the water?
    - i. Hair underwater example
    - ii. Feathery branches
      1. spread out and all water to move over them to supply gills with oxygen
      2. out of water, they clump together and don't let oxygen in
  - c. Which is more efficient: lungs or gills?
    - i. GILLS

5) **Hearts**

- a. Squids have 3 hearts
  - i. 2 are visible
  - ii. Follow gills all the way up to the midline
    - 1. 2 yellow globs of tissue on the sides at the top of the gills

6) **Reproductive System**

- a. Most squids (including the ones you guys have) are defined males or females
- b. Some are hermaphrodites (have M and F parts)
  - i. Squids tend to be loners
  - ii. They may not see another squid for a long time so when they do, they can change sex (so they can reproduce)
- c. Males will release his sperm, Females will release their eggs
  - i. At the ocean surface, at night
  - ii. A few days later, the females will die
  - iii. So when they have babies, will there be more M or F?
    - 1. FEMALE because they will die out eventually
- d. To determine sex:
  - i. Look at the top of the mantle
  - ii. Males have large, white sac with stringy white material inside (testes with sperm)
  - iii. Females have large, clear gel sac w/eggs inside
- e. If you have a male, raise your hand
  - i. Common for there to not be very many because there's so many females because they will die eventually

7) **PEN**

- a. Has anyone seen what they thought was a shell yet? We're going to take a look at what some scientists think could have been at one point in time
  - i. Others say it isn't because it's made of chiton (not calcium carbonate)
- b. Flip up the arms and tentacles
- c. Bottom part comes to a point
- d. Use your hands or scissors, rupture/break open that pointy part
- e. Pull out pen (like a clear plastic)
- f. Rupture ink sac (using scissors) and dip pen into ink sac
  - i. Write your name on your paper
- g. A long time ago, in sea-faring villages, people would bring back squids
  - i. Dry out the mantle
  - ii. Use as paper and use pen and ink sac to write messages

**CLEAN UP**

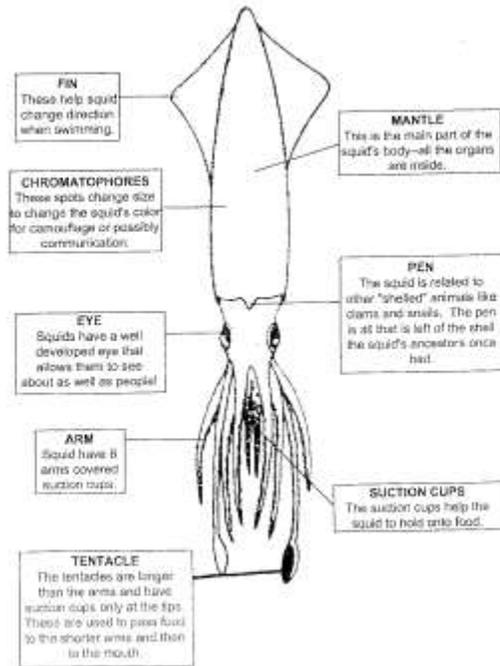
1 instrument person

1 tray person (be careful ~ blue mat is not attached!)

Show them how to take gloves off (inside out)

# INTERNAL AND EXTERNAL DIAGRAM WORKSHEETS

## Squid: External Anatomy



## Squid: Internal Anatomy

