

# Squid Dissection

## Introduction

The phylum **Mollusca** includes snails, clams, chitons, slugs, limpets, octopi, and squid. As mollusks develop from a fertilized egg to an adult, most pass through a larval stage called the **trocophore**. The trocophore is a ciliated, free-swimming stage. Mollusks also have a **radula** or file-like organ for feeding, a **mantle** that may secrete a shell, and a muscular foot for locomotion. Squid are marine mollusks that have a reduced internal cartilaginous structure called a pen. Like all mollusks, a squid has a soft, unsegmented body. It also has body plan in which its head is located between its “foot” and its “body.” In this case the foot is modified into tentacles and arms to aid in capturing prey. Squid are characterized by having a well-developed head and eyes, eight or ten tentacles, and an elongate body.

## Taxonomy

Kingdom - **Animalia**  
Phylum - **Mollusca**  
Class - **Cephalopoda**

## Objective

To study the internal and external anatomy of the cephalopod squid.

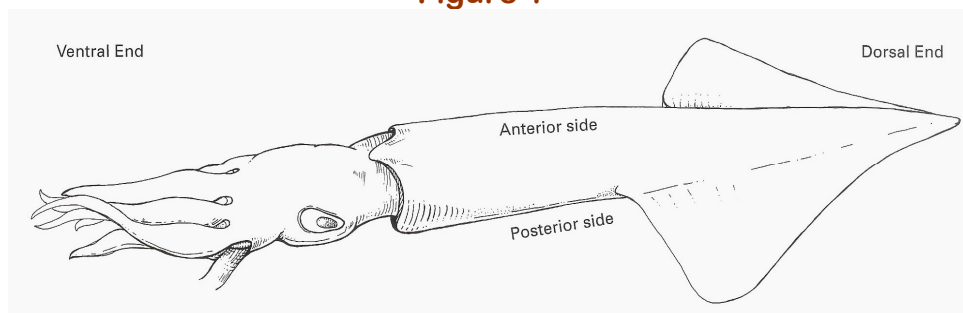
## Materials

Dissecting pan, dissecting kit, lab apron, plastic gloves, safety glasses, preserved squid

## Procedure

1. Put on your lab apron, safety glasses, and plastic gloves.
2. Place a squid in a dissecting tray and identify the dorsal, ventral, anterior and posterior parts of the squid. See Figure 1. Arrange the squid so that its dorsal end is pointing toward you and its anterior surface is facing upward.

Figure 1



3. Locate the elongate body tube or **mantle** of the squid and the two flared **fins** attached to the anterior surface.
4. Locate the **chromatophores** that cover the surface of the mantle. The chromatophores are small sacs that contain pigment. The squid's nervous system can stimulate the individual muscles attached to each sac to contract which changes the size of each chromatophore and cause the squid to change color.
5. Rotate the dissecting pan so that the tentacles of the squid are nearest to you. Lift ventral edge of the body tube, called the **collar**, to view the **mantle cavity**.
6. Locate the two large **eyes** on the head of the squid.
7. Locate and count the **tentacles** and **arms** attached to the head of the squid. These make up the foot region of the squid. Both the tentacles and the arms contain **suckers** that hold and capture prey. Each sucker may be moved independently and each has chitinous teeth within.

8. Turn the squid over so that it is resting on its anterior side (opposite Figure 2). Locate the **siphon** extending beyond the collar. A pair of large muscles is used to change the position of the siphon; and therefore, the direction of the jet of water that emerges from it. The squid uses this water jet for propulsion.

9. Locate the **mouth**. Carefully place a gloved finger into the mouth and feel the hard beak-like structure.

10. Slip your gloved finger underneath the mantle near the siphon and gently pull the mantle up. Use the scissors to cut from the siphon to the fins. Open the mantle and pin it back to reveal the internal anatomy.

11. Locate the elongate **liver**. Make delicate incisions in the liver to reveal the **esophagus**. This might best be located by starting at the mouth and following where the tube that leaves the mouth goes.

12. Find the **ink sac** dorsal to the siphon.

13. On the posterior side of the ink sac located the **rectum** and **anus** which points toward the ventral side of the body. You may have to cut the siphon to reveal this small opening. The **penis** or **oviduct** of the squid is located adjacent to the rectum.

14. Locate the feathery **gills** of the squid. Similar to humans, a **branchial vein** carries oxygen-rich blood from the gills to the heart, while the **branchial artery** carries oxygen poor blood from the heart to the gills.

15. Unlike humans, the squid has two hearts that function as a single heart with two chambers. Follow the gills toward the interior of the squid to reveal the paired **branchial hearts** or gill hearts. These pumps oxygen poor blood to the gills. Below the gills is the **systemic heart** that pumps oxygen rich blood.

16. Locate the large blue **kidney** along the rectum. By gently cutting the nephridial sac, you will reveal two triangular kidneys. Wastes are released through openings called nephridiopores into the mantle cavity where it is expelled by the siphon.

17. Toward the fin locate the **gonads**. These will be on the bottom on the anterior side of the squid. In females the gonad is generally yellow to clear, while in males it is white. In females a pair of **nidamental glands** lie above the kidneys. These produce the coverings for the eggs of the squid.

Figure 2

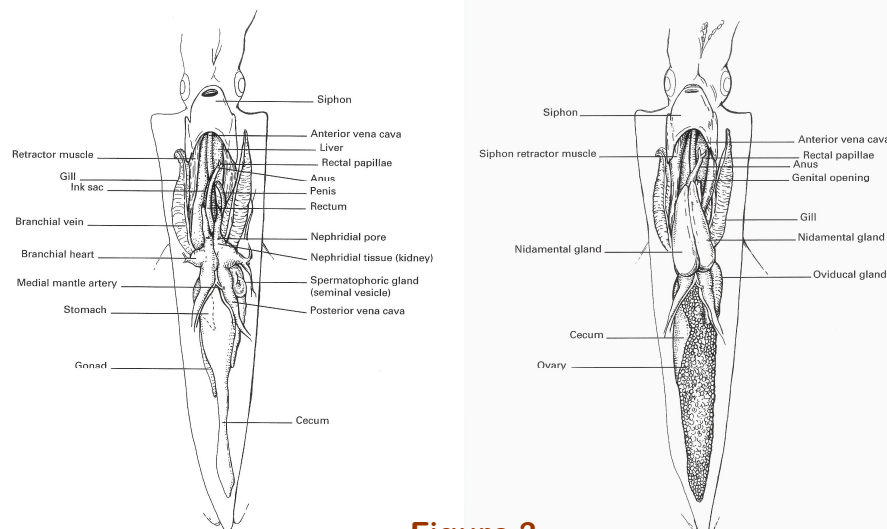
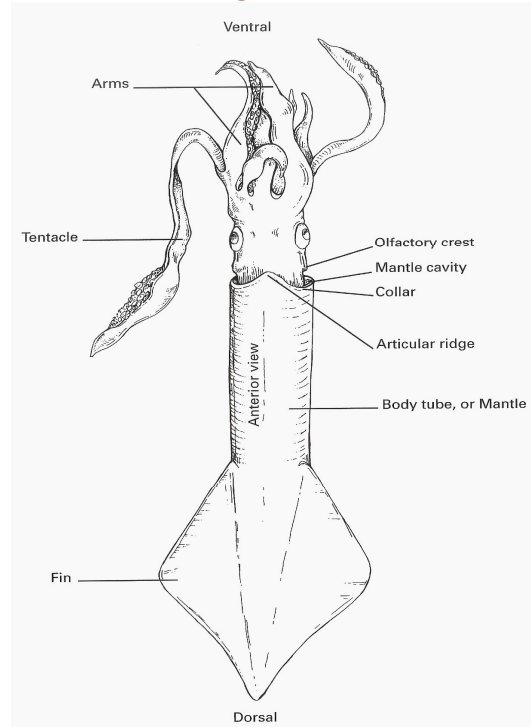


Figure 3

18. The **stomach** and **cecum** of the squid are located near the gonad, but may require you to move some tissues. Digestion and absorption of nutrients occurs in these organs. The cecum will vary in size depending upon the length of time from the squid's last meal.
19. With scissors cut out the organs in the mantle to reveal an empty cavity. Use the scissors or scalpel to tease the **pen** loose from the mantle wall.
20. Answer the questions on your lab report & label the diagrams of the external and internal structures of the squid and provide a brief description of the importance or function of each.

**When you have finished dissecting the squid, dispose of the squid as your teacher advises and clean, dry, and return all dissecting equipment to the lab cart. Wash your hands thoroughly with soap.**

## *Squid Dissection Questions*

Lab Partners: \_\_\_\_\_

Date: \_\_\_\_\_

### **Lab Questions:**

1. The squid's body can best be described as an elongate \_\_\_\_\_.
2. For what purposes might squids use their fins? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. **Suggest** some environmental cues that might stimulate a squid to change its color.  
\_\_\_\_\_  
\_\_\_\_\_
4. **Hypothesize** why the eye of the squid is so large compared to its body size.  
\_\_\_\_\_  
\_\_\_\_\_
5. Squid have \_\_\_\_\_ tentacles and \_\_\_\_\_ arms. Describe how their purposes differ?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
6. The \_\_\_\_\_ is used to force water out of the mantle cavity; and therefore, propel the squid in the water. Does the squid swim body first or foot first? \_\_\_\_\_
7. **Consider** the squid's hard beak-like mouthparts. How might a squid eat? What might it eat?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
8. What is the function of the ink sac in cephalopods? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
9. The \_\_\_\_\_ and the \_\_\_\_\_ work together to function as a two-chambered heart. How does this resemble our circulation? Why might a squid need such a comparatively well developed circulatory system? \_\_\_\_\_

---

---

10. **Observe** the portion of the squid's body that is devoted to gonad. How might this help explain the observation that most squid die after they mate and lay their eggs? \_\_\_\_\_

---

---

---

---

---

11. What does the pen feel like? \_\_\_\_\_

12. Based upon your observations of the squid's anatomy, **infer** what the ecological role of a squid is in the marine environment?

---

---

---

---

---

---

---

---

---

---