

A Cephalopod Exploration

The squid is from the class Cephalopoda, within the Phylum Mollusca. The cephalopods are the most sophisticated of the molluscs. They represent the peak of development in the invertebrates in terms of neuro-muscular co-ordination and intelligence (well developed senses and brain).

There are around 800 extant (alive) species of cephalopod. They are found throughout the world's oceans, from the shallow, tropical, warm water reefs to the cold deep ocean. Squids are very abundant and are prominent members of the marine open ocean fauna.

Name:

Date:

Partner:

Aim:

1. Locate and identify the internal and external features of the anatomy of the squid
2. Understand the form and function of a squid

Materials:

- Squid
- Lab coat
- Gloves
- Dissecting tray
- Dissecting scissors
- Tweezers
- Scalpel
- Newspaper
- Paper towel
- Pencil
- Camera

Method:

1. Collect the above equipment (except the squid)
2. Put on your lab coat and gloves
3. Place some newspaper inside the dissecting tray, and then collect your squid.
4. Orientate the squid so that the pointy end is at 12 o'clock. Lay the squid with the ventral surface facing up (the siphon (tube of tissue between the eyes) is facing towards you).

EXTERNAL FEATURES

5. Survey the overall body of your specimen. Notice the streamlined shape of the specimen.
6. What are three words to describe the appearance (shape, feel, colour) of your specimen?
 - 1.
 - 2.
 - 3.

17. Moving to the head region, you should see two large eyes and within the circle of tentacles, the horny beak. Beak shape can be used to determine different species. There are two different sizes of appendages. The short appendages are known as tentacles whilst the two much longer appendages are known as the prehensile arms.
18. The tentacles all carry numerous suckers. There should be eight tentacles.
19. The prehensile arms have suckers, but only terminally (at the end).

20. After the squid captures its prey, it holds it in its arms and consumes it.
21. *So where is the mouth found?*

22. *Please draw a sketch of the external view of your specimen, labelling all the features that have already been mentioned.*

23. Locate the mouth (within the middle of the tentacles). You need to cut between the two arms, directly below the siphon (funnel) to separate the arms and to expose the round, tough structure called the buccal bulb. Carefully cut this open with our scalpel to expose the mouthparts (beaks).
24. Try to use your fingers for opening and closing the beaks. In your opinion, are the beaks used for grinding food or ripping flesh? (Think about how it feels on your finger and relate this to your pre-exploration research about their diet).
25. Look between the beaks. You may be able to see the radula (it may be hard to find). It is a small yellowish-white ribbon or hard tissue. It acts like a toothed tongue to shred food and transfer it onto the oesophagus.
26. Draw a sketch of the beak(s) and radula below.

INTERNAL FEATURES

27. Open the mantle cavity. To do this, use the scissors to make a longitudinal (down the mantle) incision on the top of your specimen - from the bottom of the mantle (just below the siphon) to the tip of the mantle.
 28. Then cut the muscles attaching to the siphon and remove it.
 29. Lay both sides of the mantle open, exposing the internal organs.
 30. Describe what you can see. At this stage, can you see distinct organs?
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31. The **ink sac** looks like a long thin silvery fish lying on top of the central mass of organs. DO NOT CUT THIS OPEN! The ink sac contains ink that will stain your hands for weeks. Carefully separate the ink sac from the **liver** (a brownish mass of tissue). Gently lift the ink sac while cutting away the connective tissues. Once removed, place inside the newspaper lining (you don't need this anymore) and place in the bin (as allocated by your teacher).
 32. Gently rinse your squid in water (within the tray) to remove the residual ink colouration.
 33. Now cover your squid with a shallow layer of water (1 cm deep) within the dissecting tray. This ensures that the delicate organs and gills are supported by the water and also makes the organs appear more 'lifelike'.
 34. The **oesophagus** runs through the head, between the eyes and passes onto the liver, before reaching the **stomach**. This connects to a transparent, delicate and bag like **caecum**. The caecum takes up most of the space in the upper half of the mantle cavity (towards the pointy end).

35. Carefully cut open the stomach. Describe what you find.

36. Follow the digestive tract further. Next is the intestine, which leads to the anus/rectum.

37. Look for the two white organs that are feathery in appearance. They should be attached to the sides of the mantle. These are called ctenidium (gill). This surface has a large surface area (created by the feathery feel and appearance). *What is the significance of this?*

38. The squid has three hearts. These are located at the base of each gill (look for a small, flat, clear mass of tissue). These are the two gill hearts that circulates blood through the gills, where gas exchange takes place.

39. The systemic heart receives this oxygenated blood from the gills and pumps it to the rest of the body.

To find the sex of your squid:

40. **Female:** two long, white, oval glands lying on top of the internal organs at the posterior (bottom) end of the mantle cavity. These are called nidamental glands. They secrete a jelly-like substance that surrounds and protects the eggs when they are laid. An ovary may also be present.

41. **Male:** the light coloured testis will be located behind the caecum. Sperm that is produced in the testis are packaged into tiny sacs (spermatophores) - they are stored within the seminal vesicle (to the right of the mantle). The sperm travels along the vas deferens and eventually exit through the penis.

42. *Is egg fertilisation internal or external? How do you know?*

43. The last step is to remove the pen. To do this, grasp it with tweezers and use your scalpel to carefully separate the connective tissues so you can remove the pen without damaging the organs. The pen should come out in one piece.

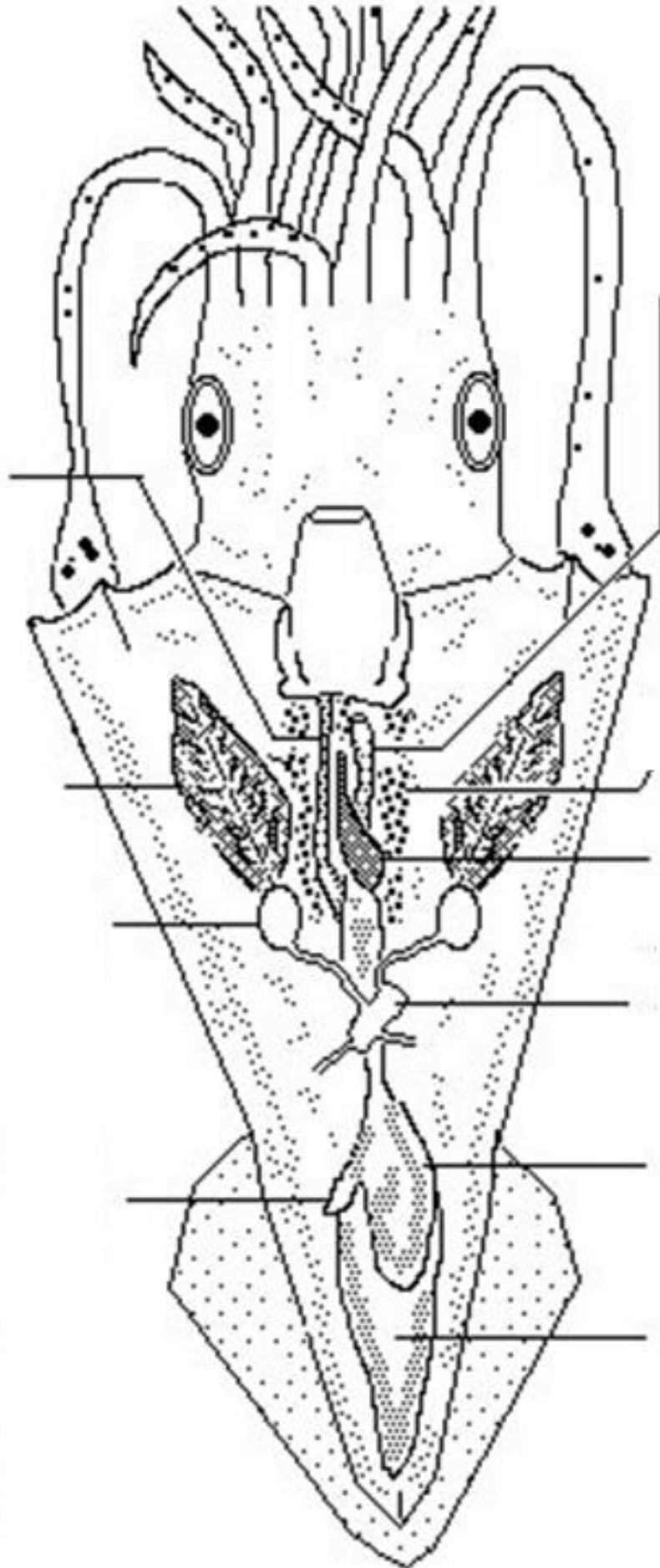
44. *Describe the pen - In your opinion, should it really be classified as an internal shell?*

Conclusion

45. *List and explain three things that you learnt today*

46. Label all the internal features (indicated via underlined, **bold** text above).

Reproductive Glands Removed



Reproductive Glands Removed

