



## 3055 BA SANGAM COLLEGE

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### WORKSHEET 19

School: **Ba Sangam College**

Subject: **Biology**

Year: **13**

Name: \_\_\_\_\_

|                          |                                                                                                                                                                                                          |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strand                   | <b>13.3 Biodiversity Change and Sustainability</b>                                                                                                                                                       |
| Sub strand               | <b>B13.3.2.6 Kingdom Animalia</b>                                                                                                                                                                        |
| Content Learning Outcome | Describe the characteristics that classify organisms in this kingdom to different categories; and explore the increasing complexities of the different groups from simple organisms to complex chordates |

#### PHYLUM MOLLUSCA

- Mollusc – have soft unsegmented body. E.g. chitons, clams, octopus, snails etc.
- Second largest phylum in the Animal kingdom.

All molluscs have the following characteristics:

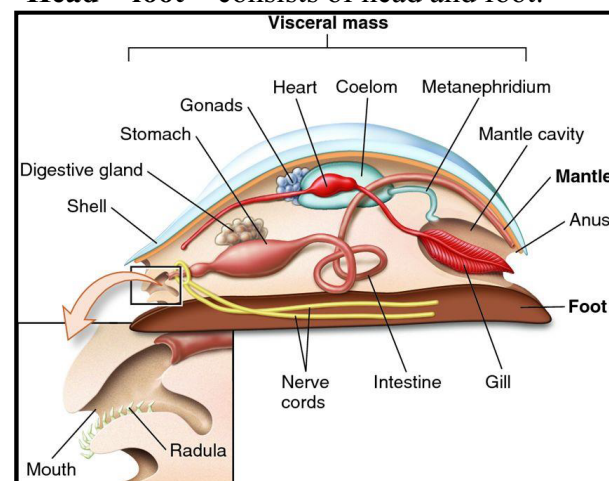
- A visceral mass containing internal organs, including the digestive tract, paired kidneys, and reproductive organs.
- A mantle that surrounds but does not cover entirely the visceral mass and secretes a shell (if one is present). The mantle also contributes to formation of gills or lungs.
- A head/foot region containing sensory organs and a muscular structure (foot) used for locomotion. The foot is a muscular structure used for locomotion, attachment to a substrate, food capture, or a combination of functions.
- A radula is an organ that bears many rows of teeth and is used for grazing on food.
- The nervous system consists of several ganglia connected by nerve cords.
- Are not segmented
- Most molluscs have an open circulatory system: a heart that pumps hemolymph through vessels into a hemocoel. Blood diffuses back into the heart and is pumped out to the body again. Some molluscs are slow

moving, and have distinctive no head, while others are active predators that have a head and sense organs.

Body divided into 3 parts.

- **Mantle** – fold of skin lying between the shell and a visceral mass.
- Provides a space between the mantle and visceral mass. The space is known as mantle cavity.
- For Protection **Visceral mass** -contains digestive tract, heart, reproductive organs and excretory organs.

“**Head – foot**”- consists of head and foot.



#### Feeding

- Radula - tongue like tissue covered with sharp teeth for scraping food
- Complete Digestive System
- Some molluscs filter feed, while others are predators

### ♦ Reproduction

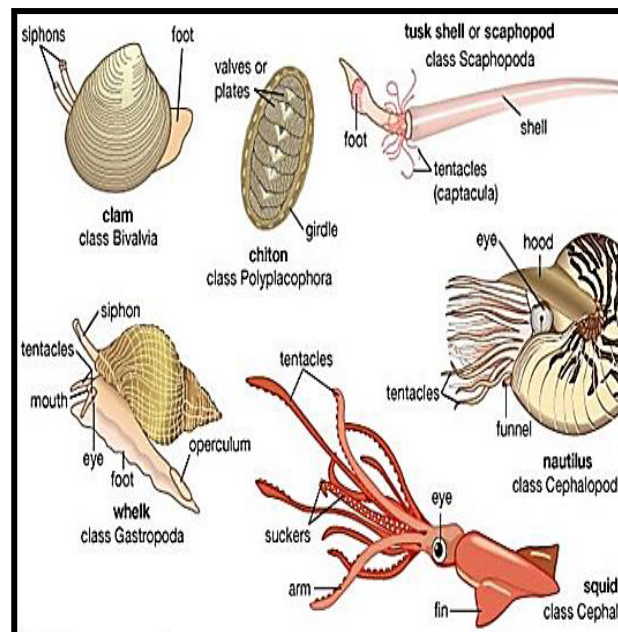
- All Molluscs reproduce sexually
- Depending on the species of mollusc, some reproduce externally or internally
- Dioecious- Have male and female
- Some are hermaphroditic
- Most molluscs produce a free-swimming ciliated larvae called the trochophore larvae. In some molluscs the trochophore develops into the adult, but in other molluscs (e.g., gastropods) there is a second larval stage called the Veliger larvae

### Common ancestry with Annelids

- Various molluscan groups are believed to have evolved from a common ancestor through adaptive radiation.
- Genus *Neopilina* (mollusc – group) -have some molluscan characteristics but they share some characteristics with segmented worms (annelids). Their body has internal segmentation. This proves that molluscs and annelids had common segmented ancestor. Larval forms of many molluscs and annelids are very similar known as trochophores. Gills and cilia present.
- Similar embryonic development i.e. undergo cleavage and are protostomes.
- Have a true coelom.

### Classes of Mollusc

- There are three commonly known classes of molluscs:
- Gastropods—include the snails and slugs.
- Bivalves—include clams, oysters, and scallops.
- Cephalopods—include the octopuses and squids.
- Other classes include Amphineura, Monoplacophora Scaphopoda.

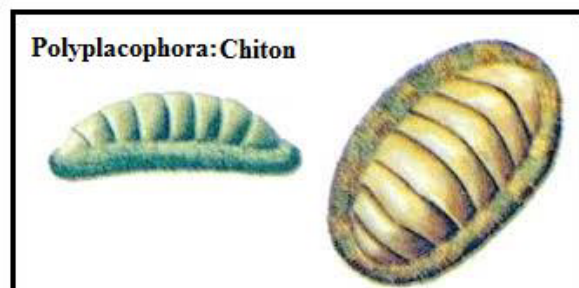


### CLASS Amphineura

Consist of two sub – classes are:

#### Sub-class Polyplacophora

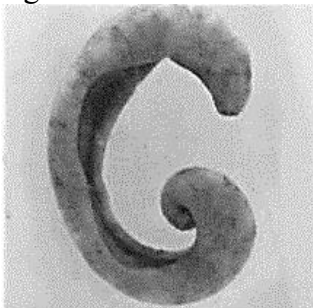
- All marine, live in shallow hard bottoms
- Eight overlapping shell plates covering dorsal surface
- Have radula to rasp algae
- Most common – chitons.
- Most primitive.
- Have ovoid bodies, bilaterally symmetrical.
- Shell-has eight serially arranged and overlapping transverse plates.
- Live on rocks in shallow seas adapted to withstand unbalancing effect of waves.
- Have broad flat feet which help it to cling to rocks.
- Feed by scrapping bits of algae



#### Sub-Class: Aplacophora

- Specific characteristics example wormlike body, no shell, but has a body wall made up of calcium spicules (think of the sponges).

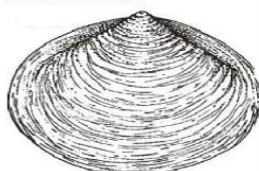
- They are generally found on the ocean floor in the deep seas.
- Are shell-less, live in moderately deep to considerably
- Feed by sucking the tissues of small organism.



### CLASS Monoplacophora

- *Neopilina* is the only genus in this entire class.
- These creatures were discovered in the 1950s while dredging the deep ocean. Specifically, they can be found around South & Central America.
- Prior to 1950s only fossil records were found.
- Their specific characteristics include;
- Single shell, broad, rounded foot

*Neopilina*  
Annelida & Mollusca

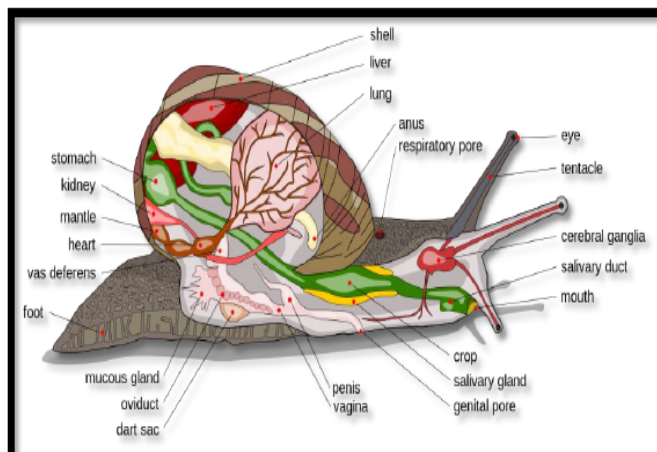


### Evidence of segmentation

- They have 5-6 pairs of gills & eight pairs of foot retractors.
- This segmentation suggests an ancestral relationship with annelids.

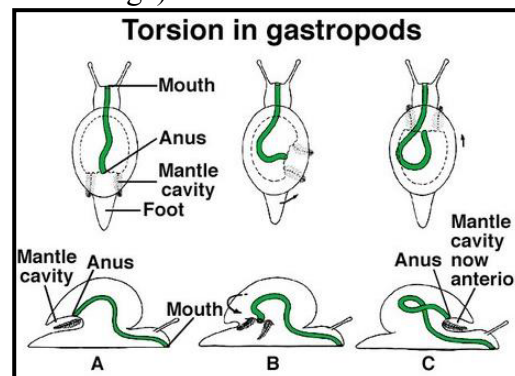
### CLASS Gastropod e.g. Snails and Slugs

- Habitats include: ocean, lake, river bottoms, coastal shores, and land e.g. land snails & shell-less slugs.
- Most popular and the largest class of molluscs.



### General characteristics of Gastropods

- They have a dorsally located shell (often coiled).
- They have a well-developed radula.
- They are herbivores or predatory (carnivorous).
- Most use radula to scrape algae
- Mud snails are deposit feeders
- Modified Radula to drill and rasp prey
- Whelks, oyster drills, and cone shells are carnivores that prey on clams, oysters, worms, and small fishes
- Have two pairs of tentacles – one has eyes at the tip
- Shells serves as protection, conserves moisture on land.
- Foot is ventrally flattened.
- Visceral mass (organs): located inside the shell. The visceral mass is rotated 180 degrees during development. Visceral mass undergoes torsion and becomes spirally coiled.
- Torsion – twisting of the visceral mass 180° in relation to the head in an anticlockwise direction (occurs during the larval stage).

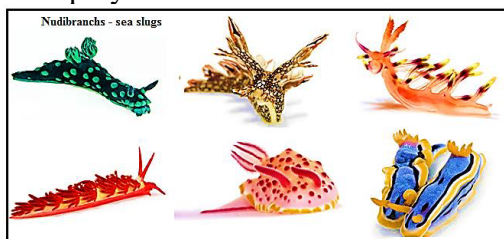


### Advantages of Torsion



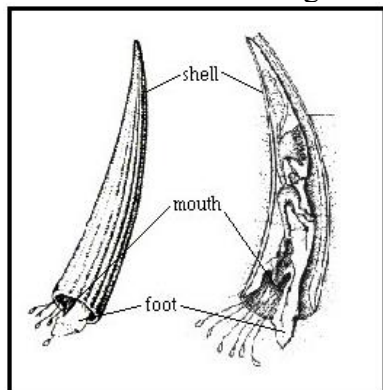
1. Brings mantle cavity in front, above the head, therefore head can be withdrawn quickly into the cavity in times of danger.
2. Sea bottom dwellers stir great deal of sediment, since mantle cavity is in front gills are bathed in cleaner sediment free water.

Sea slugs and nudibranchs or ‘Spanish dancers’) are soft tissue molluscs with colourful branches of the gut and gills. They prey on sponges and other invertebrates, and produce noxious chemicals or retain undischarged nematocysts taken undigested from prey.



### CLASS Scaphopoda (Tusk shells)

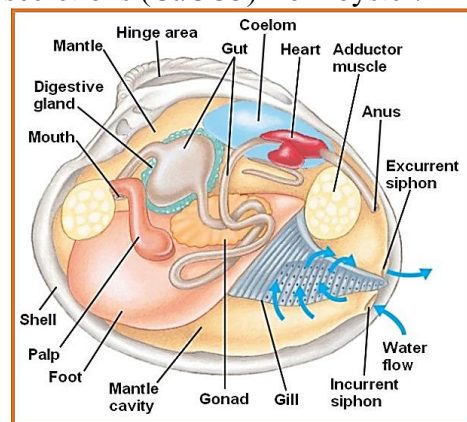
- Tusk shells or scaphopods (class Scaphopoda)
- Elongated shell tapered at end resembling elephant tusk
- Found in sandy muddy bottoms in deep water
- Many species have thin tentacles to capture small prey.
- Broad end contains head and plug- shaped foot.
- Are marine, live buried in sand or mud.
- Have bunches of slender, ciliated tentacles on the head which reach into soil and bring back small particles of food to the mouth.
- The radula is large and strong.



### CLASS Pelecypoda (Bivalvia)

- Clams, mussels, oysters and Scallops.

- Habitats include: marine and freshwater
- Are usually sedentary.
- They burrow into soft mud or sand or attach to rocks or other shells.
- Are filter feeders.
- Scallops can swim by opening and closing their valves quickly.
- Water is drawn in and out of mantle by siphons which allows clam to feed and obtain oxygen while buried. Water is filtered through the tiny pores in their gills and tiny particles of organic matter in water are trapped by mucus in the gills. These particles are then moved into the mouth by the beating action of the cilia
- Body laterally compressed and enclosed with two parts (valves). Shells made of two similar halves hinged on the animal's dorsal side. Strong muscles used to close valves
- No head or radula
- They have a ventrally located long and broad foot that sticks out between the two valves. Can pull the foot and body into the shell and shut it tightly.
- Large gills are used for respiration and filter feeding. Gills expanded and folded used to obtain oxygen, and filter and sort food particles from water
- Mussels secrete byssal threads that attach them to rocks and other surfaces
- Oysters cement their left shell to hard surface and other to another oyster. Pearls occur when irritating particles are lodged within the mantle cavity and covered by secretions (CaCO<sub>3</sub>) from oyster.



### CLASS Cephalopoda

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Are marine and contains the largest members of the molluscs e.g. Octopi, squid, and cuttlefish

- Agile swimmers with complex nervous system and reduction or loss of shell
- Predators: specialized in locomotion such as octopuses, squids, and nautilus.

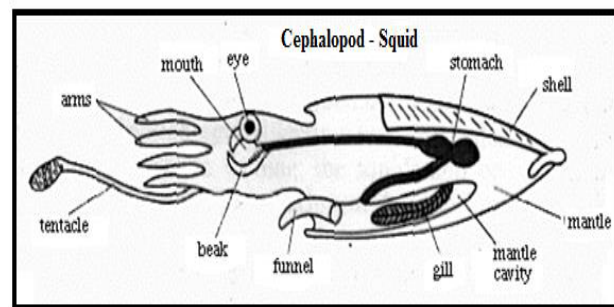
- Predatory feeding on large prey.
- Long body, surrounded by tentacles.
- Tentacles of Cephalopoda evolved from foot of ancestral molluscs.

### General Characteristics

- May lack a shell (like an octopus). However, it may be reduced to a stiffening rod (like the squid or nautilus)
- The foot is highly modified to form a group of tentacles around the mouth.
- They are found in deep and shallow waters along many coasts.
- Squids & Nautilus are free-swimming and move very quickly. Octopuses are found among rocks or crawling on the bottom of the ocean.
- Have complex brain, two large lateral eyes, and excellent eyesight.
- Thick muscular mantle which protects head
- Water enters mantle and leaves through siphon by jet propulsion

### Squids

- Have 10 tentacles and 2 large eyes.
- Largest pairs of tentacles- are used for capturing prey, while smaller ones are used for forcing the prey into the mouth.
- They squirt inky substances at enemies that blind them and dull their sense of smell.
- Chromophores (pigment spots) surrounds their body used for camouflage.
- Have a closed circulatory system.
- Have a well-developed nervous system.
- Have a Sharpe beak like radula for killing and eating the prey



### Octopus

- Has 8 long arms, 2 in to 30 feet, (tentacles) and resemble squid in movement, feeding capturing prey and escaping
- Bottom dwellers that live in crevices, bottles, etc
- Have beak-like jaws and radula to rasp flesh and secrete paralyzing substance
- Distract predators with dark fluid from ink sac
- Have a closed circulatory system.
- Have a well-developed nervous system.
- Have a Sharpe beak like radula for killing and eating the prey
- Are marine organism specialized on large quick locomotion

### Nautilus

- Is the only cephalopods that has shell. Coiled external shell containing gas filled chambers serves as buoyancy organ
- Has suckerless tentacles
- Have a well-developed nervous system
- Have a Sharp beak like radula for killing and eating the prey and a closed circulatory system.
- Are marine and specialized for large quick locomotion

### Cuttlefish

- Eight arms and two tentacles, but body flatten with fin running along the body.
- Have calcified internal shell aids in buoyancy.

