

Ch 27 Review ANSWERS: Molluscs and Annelids

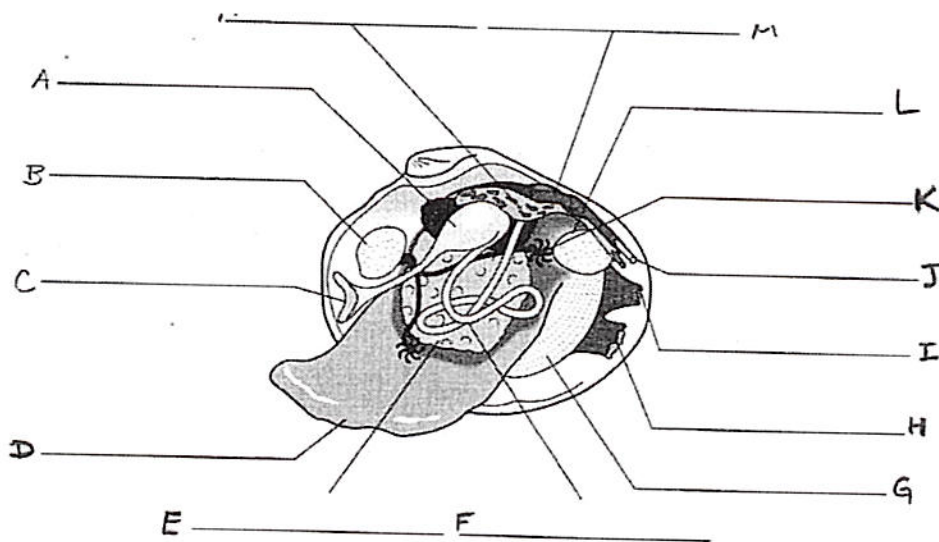
1. What are the characteristics that unify the phylum Mollusca? Annelida?
Mollusca – Has a true coelom and is a protostome.
-soft-bodied animals that have a foot, mantle, visceral and possibly a shell.
Annelida – segmented worms with a true coelom
2. What is a coelom? ***A coelom is an internal cavity that is completely surrounded by mesoderm. This cavity is separate from and usually surrounding the digestive cavity or gut.***
3. What is the difference between a protostome and a deuterostome? Which one describes an annelid? A mollusc? ***This is a division considering embryological development. In protostomes (“first mouth”) the blastopore will become the mouth, and then an anus will be created later. In a deuterostome (“second mouth”) the blastopore becomes the anus, and the mouth will be created later. Since the blastopore is one of the very first structures to be made in development, a difference in whether it becomes the mouth or the anus makes a BIG deal to the rest of the sequences of development. This is a major branch on the evolutionary tree, separating the molluscs, annelids, and arthropods from the chordates.***
4. Why are molluscs and annelids considered to be closely related? ***They both have a trochophore larvae.***
5. On what basis are the molluscs divided into classes? ***By the development of their foot.***
6. What are the functions of the four different parts of a mollusc? ***The foot is concerned with feeding – it usually has the mouth.***
The mantle secretes the shell if there is one.
The visceral mass contains the internal organs
The shell is used for protection, when present
7. What is a radula and how it is used? ***A radula is a structure that is shaped like a tongue with many tiny teeth on it. Snails and slugs use this for grinding through shells to get at the soft stuff underneath, or for scraping algae off of rocks.***
8. Which of the molluscs are considered filter feeders? ***The bivalves.***
9. How do the filter feeders eat? ***They use their gills to filter out the small food particles from the water.***
10. How do filter feeders and other aquatic molluscs breathe and get rid of CO₂? ***Filter feeders use their gills for collecting food AND for collecting Oxygen, getting rid of carbon dioxide.***
11. How do land snails and slugs breathe? What organ does this simulate? ***Land snails and slugs breath using a moist cavity inside their mantle that is covered in blood vessels. The mantle is convoluted to increase the surface area available for oxygen diffusion into the blood vessels. This is very similar to our lungs, although ours are much more efficient.***

12. What is the difference between an open circulatory system and a closed system? *A closed circulatory system has all of the blood contained within blood vessels. This requires a pump to move the blood around the "circuit". An open circulatory system also has blood vessels and a pump (primitive heart) but there are cavities called sinuses that the vessels drain into – it is in these sinuses that the oxygen and nutrients from the blood are transferred to the cells that are surrounding the sinuses.*
13. What types of animals have an open circulatory system? Why do other animals have a closed one? *Open circulatory systems are not as efficient as closed systems, so only animals that have a slower lifestyle can afford to have one. Relatively non-motile molluscs such as the bivalves often have open systems, while the faster moving squid and octopi have closed systems.*
14. How do molluscs and annelids get rid of solid waste? Metabolic wastes? *All mollusc and annelids are coelomates – they have a tube-within-a-tube body plan. This means that they have an anus to get rid of their solid waste. Metabolic wastes (ammonia for them, urine for us) are removed from their body through many nephridia. (We have kidneys that are packed with structures called nephrons to get rid of ours)*
15. What types of simple sense organs do bivalves have? *Chemoreceptors, touch receptors, ocelli, statocysts*
16. Why is it thought that octopi (and other tentacled molluscs) are more intelligent than some vertebrates? *They have a much more developed nervous system with more complex sensory organs. They have eyes that can actually perceive an object, and they have a well developed brain that is capable of memory, and learning.*
17. How do most molluscs reproduce? *Most reproduce sexually by external fertilization.*
18. What is a disadvantage to using external fertilization in the water as molluscs do? *With external fertilization in molluscs, they release the sperm and eggs into the water and just hope that they run into each other. It is a bit of fertilization by chance – the ocean is a big body of water!*
19. What other methods of reproduction are employed by molluscs? What types of molluscs use these methods? *Octopi (tentacled molluscs) and some snails have internal fertilization with separate sexes. Some snails are hermaphrodites and exchange sperm with each other when they get together, and oysters change their sex every once in awhile – sometimes they are the male and sometimes they are the female! (what an option!)*
20. What does gastropod mean, and why are these creatures called this? *Gastropod literally means "stomach foot". This describes how the foot has elongated on the ventral side of the animal. They move using this foot that is on their "stomach" side.*
21. List some common examples of gastropods, cephalopods, and bivalves.
*Gastropods: Snails, slugs, nudibranch (sea slugs), conchs, and abalones.
 Cephalopods: Nautilus, octopi, squid, cuttlefish
 Bivalves: Clams, scallops, mussels, oysters*

22. Study all the pictures in the chapter to become familiar with the common names of the different types of molluscs and annelids.

23. Label the following diagram of the internal structure of the clam. Beside the structure, briefly describe the function of each of the structures.

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|-------------------------------|------------------------------------|
| a. stomach | h. Exhalent siphon |
| b. adductor muscle | i. Inhalent siphon |
| c. mouth | j. anus |
| d. foot | k. ganglion (group of nerve cells) |
| e. gonad (reproductive organ) | l. adductor muscle |
| f. intestine | m. heart |
| g. gills | n. nephridium |



24. Describe the digestive system of a clam. *Food enters carried in the water through the incurrent siphon. Gills inside trap the food particles and cilia move the food to the mouth (inside as well) From the mouth the food travels to the stomach and intestines, where it is digested. Solid waste (the indigestible food particles) are passed out of the body through the anus.*

25. How do snails protect themselves from predators? *They hide inside their shells, and some even have a "door" that they pull shut when they go inside.*

26. What is the other common name for a nudibranch? How do nudibranchs protect themselves from predators? *Nudibranchs are often called sea slugs. They sometimes taste bad, or are poisonous. These ones usually display that they are "bad" by having bright colours or spots to warn their predators. Some also save the nematocysts from the cnidarians they eat and use them against their predators!*

27. What are other defence mechanisms do gastropods have? *Land slugs rarely come out during the daytime, and stay concealed under mud and rocks. Sea hares squirt purple ink as a smoke screen, and some sea butterflies can swim extremely fast.*

28. What defence mechanisms do cephalopods use? *Cephalopods use jet-propulsion of water to shot themselves rapidly backwards to get away from predators. They might also squirt some foul-tasting black ink in the predator's face before taking off out of the danger zone. They can also change color for camouflage.*
29. What happens if grain of sand gets caught between the shell and the mantle? *The mantle will cover the sand with layers of mother of pearl to try to smooth out the irritating grit– eventually it will make a pearl.*
30. What does cephalopod mean? *Cephalopod means “head-foot”. These animal's head is attached to the foot – and it has developed tentacled.*
31. Why are some molluscs (which ones?) considered marine environmental monitors? *Bivalves are considered environmental monitors because they are filter feeders – they tend to concentrate toxins/poisons or other biohazards in their bodies. Looking at what is in the bivalves gives us an indication of what is in the water.*
32. What is of interest to cancer researchers regarding some molluscs? *There are some molluscs that never develop cancer. We would like to know what protects their cells, that isn't protecting ours!*
33. What is of interest to doctors regarding mussels? What might they use this information for? *Mussels produce a type of glue that adheres them (very effectively) to the surface of rocks. This is of interest to us, because it is a biological glue that is able to work in SALT WATER, something that is very difficult to do. It might have applications in reattaching internal structures such as blood vessels and nerves, that are constantly bathed in a saline-like solution inside the body.*
34. Label the following diagram of the earthworm. Beside each structure, describe the function (briefly).
- a. *mouth- entrance to digestive system*
 - b. *brain - coordinates nervous system*
 - c. *pharynx – sucks food in through mouth – sends it to the stomach via the esophagus*
 - d. *esophagus – passageway from pharynx to stomach*
 - e. *“heart” – enlarged ring vessels that act as a heart to circulate blood*
 - f. *seminal vesicles – male reproductive organs – make sperm*
 - g. *dorsal blood vessel – carries blood towards the head*
 - h. *ventral blood vessel - carries blood away from the head*
 - i. *crop – temporary storage*
 - j. *gizzard – grinds food to smaller particles*
 - k. *septa – separate the segments*
 - l. *intestines – digest food; nutrients are absorbed into the blood stream from here*
 - m. *nephridia – excrete ammonia (metabolic wastes)*
 - n. *anus – excrete solid wastes*

35. What is an earthworm's cuticle and what is it for? *The cuticle is a thin protective coating that keeps the earthworm's skin moist. It must stay moist to enable oxygen to diffuse through the skin. (this is true in our own bodies, inside our lungs. The alveoli walls are always kept moist with a thin layer of mucus.)*
36. Describe the circulatory system of an earthworm. *The earthworm has a closed circulatory system, with two main blood vessels – a dorsal and ventral line. Smaller branches called ring vessels connect the dorsal and ventral vessels in each of the segments. At the head, several of the ring vessels are enlarged and act as pumps, circulating the blood towards the head on the dorsal line, and away from the head at the ventral line.*
37. Describe the digestive system of an earthworm. *The earthworm sucks in the dirt and detritus with its pharynx and forces it through the esophagus and into the crop where it can be stored if necessary. It then passes into the gizzard which grinds the food and moves into the intestines, where it is digested. Finally, the undigested wastes (called castings) exit through the anus.*
38. What types of annelids are considered to have the most highly developed nervous systems? *Free-living marine annelids have developed sensory organs, and specialized structures and cells such as sensory tentacles, statocysts, chemoreceptors and multiple eyes. (some of the eyes can actually perceive images.*
39. What types of sensory organs do earthworms have? Sensory cells? *Earthworms have no sensory organs, though they do have some sensory cells (statocysts, chemoreceptors, ocelli) scattered around their bodies.*
40. How do earthworms move? *Earthworms have two sets of muscles – longitudinal and circular. When the longitudinal muscles contract, the diameter of worm increases, and the worm gets shorter. When the circular muscles contract, they make the diameter smaller, which makes the worm stretch out. Coordinated shortening and lengthening using the setae (tiny bristles pointed towards the back) on their ventral surface to push against, causes them to move in the direction they choose.*

41. How do annelids protect themselves against predators? What is a “Fireworm”? *Earthworms don’t have much protection other than going down a hole and holding on, but marine fan worms create a tube of calcium carbonate for itself to hide in, and some marine carnivorous worms will even fight back with a good bite. Fireworms are polychaetes whose bristles easily break off and leave poisons in their predators that are very uncomfortable.*
42. How do most annelids reproduce? *Most annelids (like most molluscs) practice external fertilization.*
43. How do the polychaetes called Palolo worms solve this problem, but cause themselves another? *Palolo worms all get together at spawning season and float at the surface while releasing the sperm or eggs into the water. This way, fertilization has a MUCH greater chance of happening. However, they leave themselves exposed to predators (including humans) when they congregate all together at the surface!*
44. How do earthworms reproduce? *Earthworms are hermaphrodites. They exchange sperm simultaneously.*
45. What do earthworms do after they have exchanged sperm? *They store the sperm in special sacs until the eggs are ready to be fertilized. When the eggs are ready, the clitellum secretes a mucus sac and moves the sperm and eggs into this sac. The sac will slide off the worm’s body as it moves, and will remain as a protective cocoon around the fertilized eggs.*
46. Why don’t hermaphrodites usually practice “self-fertilization”? Under what circumstances might it be an advantage if they did? *If they were to self-fertilize, they would defeat the purpose of sexual reproduction; to mix up the gene pool and create greater variation in the species. If they were really having a hard time finding a mate, it would be advantageous if they could self-fertilize just to perpetuate the species.*
47. What are the characteristics that identify the Polychaetes? *Polychaetes are bristled worms. They have paddle-like extensions on each segment that end in bristles – some of which are so long and large they look like fur. (check out the “sea mouse” on page 599)*
48. What types of substances are found in leech’s saliva that is of interest to doctors? *Leech’s saliva can contain an anaesthetic, an anticoagulant, and an antibiotic. They also are able to keep the blood that they collect for up to a year without going bad in their belly. Keeping blood fresh is of interest to the doctors who collect blood for storage.*
49. How much does a leech eat in one sitting? If it gets a full belly, when does it have to eat again? *A leech can eat up to 10X it’s body weight in blood. When full, it won’t have to eat again for about a year.*
50. How do earthworms improve the soil for new growth to occur? *Earthworms are constantly burrowing through the soil, allowing air to get through it. This helps keep a healthy supply of decomposers alive, speeding up the process of decomposition. The earthworms themselves help with the decomposition, breaking the soil down and releasing the nutrients so they are more readily available for plants to use.*