

Evolution of Digestive Systems Concept Questions

1. Use the terms photoautotroph, chemoautotroph, photoheterotroph, and chemoheterotroph to classify each of the following:
 - a) Your friend loves sitting in the sun eating delicious grapes. (chemoheterotroph)
 - b) An organism grows in sunlight and converts CO₂ into organic carbon. (photoautotroph)
 - c) Certain bacteria grow in sunny rice paddies, using organic molecules in the soil to build the molecules they need. (photoheterotroph)
 - d) A bacterium living in a deep-sea vent where there is lots of hydrogen sulfide and uses CO₂ to make organic molecules. (chemoautotroph)
2. It's reasonable to think of the three major groups of protists as being the ancestors of plants, fungi and animals. How does protist nutrition support this idea? (Each of the three groups of protists (plant-like, fungus-like and animal-like) has a mode of nutrition similar to plants, fungus, or animals)
3. Explain why plant-like protists are so important in aquatic food chains. (The producers in a food chain use photosynthesis to make food for other organisms in the chain. Plant-like protists are at the base of many aquatic food chains.)
4. Both humans and fungi are heterotrophs. Contrast the way the two obtain food. (Fungi use extracellular digestion by excreting digestive enzymes and then absorbing the nutrients. Humans eat food and then digest it internally.)
5. How is extracellular digestion advantageous to an animal? (Extracellular digestion is advantageous because it allows the animal to eat and digest an item larger than could be digested inside a cell.)
6. A diver releases a small amount of dye into the water next to a sea sponge. After a few seconds, the dye is seen escaping from the top of the animal. Explain this observation. (Sponges feed by filtering food particles from the water. The dye entered the animal through holes in the body and passed out the opening at the top of the animal.)
7. How has the digestive system of planaria been improved over that of the jellyfish? (Planaria have organs and a branching gut rather than the simple gastrovascular cavity of the jellyfish. The branching improves the efficiency of getting nutrients to all cells.)
8. How have the digestive systems of the roundworm and segmented worm been improved compared to that of flatworms? (The digestive system of roundworms is one-way and food can be processed continually because of the additional set of muscles lining the coelom. Segmented worms also have specialized organs for digestion.)
9. How is a gastrovascular cavity different from an alimentary canal? (A gastrovascular cavity is a simple, open space which might or might not be branched to help distribute nutrients. An alimentary canal is a long tube with specialized organs attached.)

10. We learned that cephalopods have a closed circulatory system. Considering their feeding strategy, why is that important? (To be active predators, cephalopods need a more efficient circulatory system.)
11. Your friend also took Biology 11 and said that one reason insects have been so successful is their variety of feeding strategies. Would you agree or disagree? (Insects have diverse feeding strategies that depend on specialized feeding appendages. This has enabled them to diversify to exploit a wide variety of food sources.)
12. Mammals usually eat several times a day while reptiles are often able to go long periods without eating. Provide an explanation for this difference. (Ectotherms like reptiles do not need as much food.)
13. a) What are the advantages of being an endotherm? (Endotherms can live in cold climates. They also have no need to wait for the ambient temperature to increase so they can become active before some prey and predators.)
b) What is the cost? (Endotherms must consume more food than ectotherms in order to produce the heat required to warm their bodies.)
14. There is an old expression that says someone with a small appetite “eats like a bird.” Why is this expression inaccurate? (Birds are endotherms and are very active so they actually have to eat a large amount relative to their weight. They eat small amounts often because their digestion is rapid to minimize weight.)