Name _____ **Period** _____

Chapter 33: An Introduction to Invertebrates

Chapters 31, 32, and 33 should be considered as a single unit, and you should try to put all of them together in a single conceptual framework. It is not expected that you master the phylogeny of animals, but it will help you organize evolutionary adaptations if you become familiar with the names of some of the groups and the features that are unique to the group. For each of the phyla that we highlight in the following questions, try to know the characters that are unique to that group, and focus on the evolution of various systems. Our goal here is to focus your time and energy on the most fundamental information for each group. This will also help you be more literate in biology—we would be disappointed if our students did not know the difference between a reptile and an amphibian, or that insects have exoskeletons.

Concept 33.1 Sponges are basal animals that lack true tissues

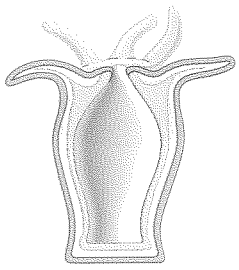
1. You may have learned in an earlier course that sponges are in the phylum Porifera. This group is thought to be monophyletic, but scientists are still debating the issue. They are the simplest animals and lack true tissues. Why are sponges considered to be *basal animals*?

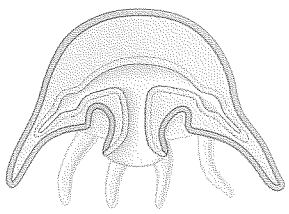
2. Most sponges are *hermaphrodites*. What does this mean?

3. Consider that the sponges have only two cell layers, and both are in contact with the surrounding medium. They have no specialized tissues, and therefore no organs. Explain how a sponge obtains oxygen or gets rid of wastes.

Concept 33.2 Cnidarians are an ancient phylum of eumetazoans

4. Now to the jellyfish, hydra, sea anemones, and their relatives. All the animals in this group have stinging cells and are called *cnidarians.* Cnidarians are *diploblastic* (only two tissue layers) and have *radial symmetry*. They have two body forms: polyp and medusa. The polyp looks a bit like a vase with tentacles. If you flip the polyp form, squish it a bit, and give it a flotation device, you will have the body form of a jellyfish, called a medusa. On this figure, label *polyp, medusa, gastrovascular cavity, mouth/anus, epidermis, tentacle, mesoglea*, and *gastrovascular cavity*.





5. What are *nematocysts*, and how do they help a cnidarian obtain its food?

6. What is the nervous system of a cnidarian? Does it have a brain?

7. What is the "skeleton" of a cnidarian? Check the glossary to explain how this type of skeleton works.

***Concept 33.3** Lophotrochozoans, a clade identified by molecular data, have the widest range of animal body forms*

You may breathe a sigh of relief to know that we are going to condense this section and look at only three phyla: Flatworms, Molluscs, and Annelids.

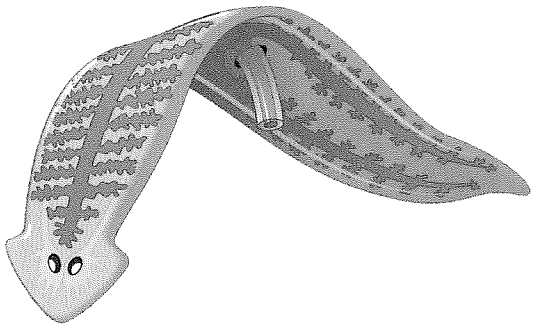
8. Flatworms have no specialized system for gas exchange, so it occurs by diffusion. Refer to the *Make Connections* figure on page 689. How does the shape of the flatworm body enhance exchange of oxygen and carbon dioxide?

9. Again using the *Make Connections* figure, explain how it is possible for food molecules to be transported to the cells of a flatworm with no circulatory system.

10. Here are three groups of flatworms you should know: planaria, flukes, tapeworms. For each group, tell how they obtain food, and important features.

Example(s)	Lifestyle	Features to Note
Planaria		
Flukes		
Tapeworms		

11. Planaria are the only free-living (not parasitic) examples from the previous chart. Notice the presence of *eyespots* and *ganglia* in the Planaria. Label them. This is the first group we see with *bilateral symmetry* and sense organs concentrated at the anterior end.



12. Label the *mouth* in the Planaria. Where do wastes leave? The digestive system seen here is sometimes called two-way. Why?

13. Look at the evil head of a tapeworm! How do they attach to the gut of the host? This is another worm with a complex life cycle. How might *you* get a tapeworm?

14. Tapeworms have no digestive system. Why not? Frame your response in terms of surface area as well as habitat.

15. Here are some important features of molluscs (phylum Mollusca). Explain each one.

    muscular foot

    mantle

    radula

16. You are familiar with many molluscs. List three examples from different groups, and give an important feature for each group.

17. The last phylum is the annelids (phylum Annelida) and includes leeches and earthworms. What is a common name for this group, and how do the members get this name?

***Concept 33.4** Ecdysozoans are the most species-rich animal group*

18. What do the root words that name this group mean?

    ecdyso–

    –zoan

19. The Nematodes (phylum Nematoda) include the worms we often call roundworms. Their bodies are cylindrical, unlike those of the flatworms, and lack segmentation. *Caenorhabditis elegans (C. elegans)*, a widely studied model research organism, is an example of a free-living nematode. Some interesting parasitic nematodes include the human parasites pinworms, hookworms, and *Trichinella*. How could you get trichinosis?

20. How does *Trichinella* affect gene expression in its hosts?

21. Arthropods have an *exoskeleton.* What molecule is it made of? How can an arthropod grow?

22. Let's focus on some specific arthropod groups. How many legs do *arachnids* have? What are three examples of *arachnids*?

23. *Millipedes* and *centipedes* are placed in the subphylum Myriapoda, which means "many legs." Complete the following chart.

Example	Legs per Segment	Diet
Millipedes		
Centipedes		

24. *Crustaceans* are primarily aquatic and have many pairs of appendages. How many appendages does a lobster have?

25. What specialized respiratory structures do many crustaceans have?

26. Insects form an enormous clade.

    a. How many legs do all members have?

    b. What are the three body regions of insects?

    c. Insects show two types of metamorphosis. Explain each type.

    incomplete metamorphosis

    complete metamorphosis

27. Complete this chart to summarize the different groups of arthropods.

Group	# of Appendages	Respiratory Organs	Examples
Arachnids			
Insects			
Crustaceans			

Concept 33.5 *Echinoderms and chordates are deuterostomes*

28. What does the phylum name *Echinodermata* mean?

29. Name three different echinoderms.

30. As adults, many echinoderms appear to have radial symmetry, but *their larval stage is bilateral.* This is an important feature to note. As you read this section, what other interesting facts do you find about members of this group?

Test Your Understanding Answers

Now you should be ready to test your knowledge. Place your answers here:

1. _____ 2. _____ 3. _____ 4. _____ 5. _____