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Section 29–1 Invertebrate Evolution

(pages 745–750)

Key Concept

- What are the major trends in invertebrate evolution?

Introduction (page 745)

1. What are three places where fossils have been found that shed light on the origins of invertebrates?
   - **a.** Ediacara Hills, Australia
   - **b.** Chengjiang, China
   - **c.** Burgess Shale deposits in the Canadian Rockies

Origin of the Invertebrates (pages 745–747)

2. What are trace fossils? They are tracks and burrows made by soft-bodied animals whose bodies were not fossilized.

3. Circle the letter of how old the fossils of the Ediacaran fauna are.
   - **a.** 700–600 years old
   - **b.** 6500–7500 years old
   - **c.** 60–75 million years old
   - **d.** 610–570 million years old

4. Is the following sentence true or false? Most fossils of Ediacaran fauna show little evidence of cell specialization. false

5. What is the best known site of Cambrian fossils? The Burgess Shale of western Canada

6. Circle the letter of each sentence that is true about animals of the Burgess Shale.
   - **a.** They were ancestors of most modern animal phyla.
   - **b.** They had features that are characteristic of most invertebrates living today.
   - **c.** They had specialized cells, tissues, and organs.
   - **d.** They were far less diverse than animals that lived earlier.

7. What features of the Burgess Shale animals made them so successful? The anatomies of Burgess Shale animals typically had body symmetry, segmentation, some type of skeleton, a front and a back end, and appendages adapted for many functions.

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Invertebrate Phylogeny (page 747)

8. To which group of invertebrates are chordates most closely related?
Echinoderms

9. Number the features below according to the sequence in which they evolved. Number the feature that evolved first *1*.
4 **a.** Deuterostome development
1 **b.** Tissues
3 **c.** Coelom
2 **d.** Protostome development

Evolutionary Trends (pages 748–750)

10. What does the appearance of each phylum in the fossil record represent in terms of evolution? Each represents the evolution of a successful and unique body plan.

11. As larger and more complex animals evolved, in what ways did specialized cells join together? Specialized cells joined together to form tissues, organs, and organ systems that work together to carry out complex functions.

12. Circle the letter of each animal group that has organ systems.
a. flatworms
b. cnidarians
c. mollusks
d. arthropods

13. What are the two kinds of symmetry that invertebrates exhibit? Bilateral symmetry and radial symmetry

14. What is cephalization? It is the concentration of sense organs and nerve cells in the front of the body.

15. What body plan and lifestyle characterize invertebrates that have evolved cephalization? They exhibit bilateral symmetry and rely on movement for feeding, defense, and other functions.

16. What are the three germ layers that most invertebrates develop from?
a. Endoderm
b. Mesoderm
c. Ectoderm

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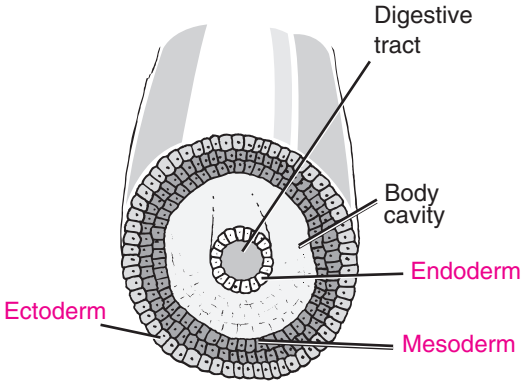
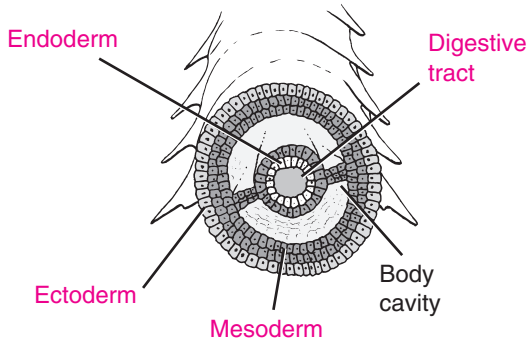
17. What is a coelom? It is a body cavity.

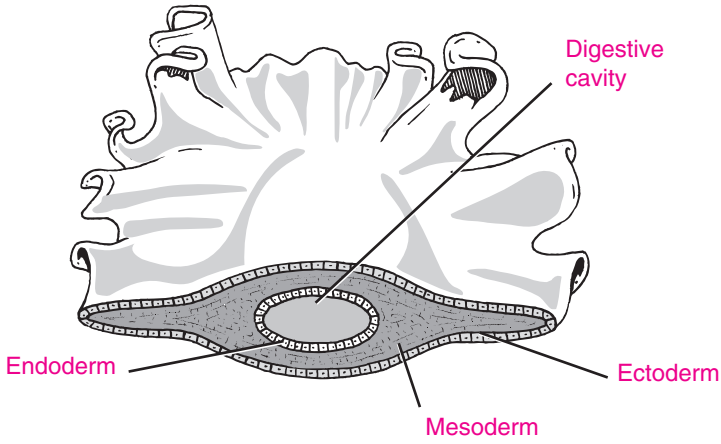
18. Label each of the cross sections of the acoelomate, pseudocoelomate, and coelomate.



Pseudocoelomate



Coelomate



Acoelomate

19. What does segmentation allow an animal to do with a minimum of new genetic material?
It allows an animal to increase in body size.

20. Most complex animal phyla have a true coelom that is lined completely with mesoderm.

21. In most invertebrates, the zygote divides repeatedly to form a(an) blastula.

22. What is the difference in early development between a protostome and a deuterostome? In protostomes, the blastopore develops into a mouth. In deuterostomes, the blastopore develops into an anus.

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23. Which groups of invertebrates are protostomes? Flatworms, roundworms, annelids, mollusks, and arthropods are protostomes.

24. Complete the table that shows the general characteristics of the main groups of invertebrates.

Invertebrate	Germ Layer	Body Symmetry	Cephalization	Coelom
Sponges	absent	absent	absent	absent
Cnidarians	two	radial	absent	absent
Flatworms	three	bilateral	present	absent
Roundworms	three	bilateral	present	pseudocoelom
Annelids	three	bilateral	present	true coelom
Mollusks	three	bilateral	present	true coelom
Arthropods	three	bilateral	present	true coelom
Echinoderms	three	bilateral	present	true coelom

Reading Skill Practice

A good way to show similarities and differences between items is with a Venn diagram, which consists of two or more circles that overlap. Create Venn diagrams that compare these groups of invertebrates: (1) cnidarians and roundworms, (2) annelids and mollusks, and (3) arthropods and echinoderms. Use the table in Figure 29–5 for the information to be contained in your diagrams. For more information about Venn diagrams, see Organizing Information in Appendix A of your textbook.

Students should make three Venn diagrams, each reflecting differences and similarities in germ layers, body symmetry, cephalization, coelom presence, and early development.