

# AP Biology Winter Assignment

Due Friday, January 6, 2012

The Winter Assignment, “Parade Thru the Kingdoms”, is literally a parade of the evolutionary history of life on earth documented by our textbook authors in Chapters 27 thru 34. The assignment involves an in-depth study of Domain Bacteria/Archaea (Chapter 27) and the rather large Domain Eukarya (Chapter 28, 31, 32, 33, and 34). Our future Spring Assignment will continue with a “Parade Thru the Plants” which will involve a study of the evolutionary history of plants in Chapter 29 and 30 as well as introductory botany, plant anatomy, and physiology as discussed in Chapters 35 thru 39.

Begin each assignment, winter and spring, by first reading thru **ALL** of the questions in each assignment. Then preview the text by reviewing all of the figures, tables, diagrams, and graphs being certain to carefully read the captions. Lastly, **BEFORE** beginning the assignment it would be most beneficial to read ALL of the chapters covered in each assignment before you begin responding to the questions or tasks. The diagram, table and figure references are intended to be helpful hints or to be used as a springboard to your review of the content material and should not be viewed as the location of the “**answer**” to the questions they are intended to merely support. Be advised that the desired responses can be located in multiple references within the range of chapters in our textbook in which the assignment covers as the “parade” theme of the assignment suggests BUT also can be addressed in other chapters as well so definitely use your textbooks **index** to help you navigate through all of the references available to you. Each assignment can also be supported by the internet since new and exciting discoveries are occurring daily due to new advancements in genetic analysis and the application to evolutionary history.

We are using a slightly, more recent edition which appears to differ from **BOTH** AP\* teachers editions for the sixth **AND** seventh edition of which I based the winter assignment. We have had an issue with some of the diagrams and figures in previous years so in the table on the following page there are some suggestions for handling some of the changes as we move from one edition to the next.

Enjoy your “Parade through the Kingdoms”,

Dr. Senegar-Mitchell

Winter Assignment Page No.	Original Reference	Related/Alternative Reference
Page 3 (Part 2)	Table 27.2/p. 512	Figure 1.15/p. 14 Figure 26.22/p. 530 Table 27.2/p. 541 TEXT: Chapter 27
Pages 5-6 (Part 2)	Figure 28.8/p. 554 – Please review this discussion...you will need to identify and understand the anatomical adaptations and characteristics which lead to the branch points indicated and caused the divergence of two previously related lines of organisms who had a common ancestor.	Figure 28.4/p. 552 Table 28.1/p. 571 TEXT: p. 521-531 and Chapter 28
Page 8 (Part 2)	Figure 31.4/p. 619 – Use to first understand the basic structure of fungi so that you can better understand the adaptations that occurred and the loss of certain anatomical structures as these kingdoms members evolved.	Figure 31.4/p. 610 Figure 31.9/p. 613- updated to include new phyla, Glomeromycota Figure 31.11/p. 613 - updated loss of flagella discussion Figure 31.16/p. 616 Figure 31.18/p. 618 Table 31.1/p. 624 TEXT: Chapter 31, 32
Pages 11 (Part 2)	Figure 32.4/p. 626 – Review this and the figures indicated to understand the developmental distinctions discussed on pages 634 and 635. These characteristics are the basis of differences among members of the animal kingdom.	Figure 32.4/p. 628 Figure 32.7/p. 630 Figure 32.8/p. 631 Figure 32.9/p. 632 Figure 32.10/p. 634 Figure 32.11/p. 635 TEXT: Chapter 32, 33 } Review
Page 17 (Part 2)	Table 32.4/p. 636 Table 33.7/p. 675	Figure 33.2/p. 638 Figure 33.3/p. 639 Figure 33.37/p. 662 Table 33.7/p. 668 <b>ALL Tables in CH 33</b> TEXT: Chapter 32, 33
Pages 19 (Part 2)	Table 34.7/p. 684	Figure 34.2/p. 672 Figure 34.23/p. 687 Figure 34.36/p. 698-99 TEXT: Chapter 34

**Due Friday, January 6, 2012**

Name \_\_\_\_\_

**AP Biology Winter Assignment  
Parade through the Kingdoms**

**A Brief Survey of Life's Diversity**

*Complete the questions using Chapters 26-34 of your textbook: Biology (7th Edition) by Campbell and Reece.*

**Chapter 26: Origin of Life**

1. Start with the origin of the earth and identify the time frame, conditions, and evidence for each of the following steps leading to current life forms on earth.

a. Origin of the earth \_\_\_\_\_

\_\_\_\_\_

b. Prokaryotes \_\_\_\_\_

\_\_\_\_\_

c. Oxidizing atmosphere \_\_\_\_\_

\_\_\_\_\_

d. Eukaryotic cells \_\_\_\_\_

\_\_\_\_\_

e. Multicellular life \_\_\_\_\_

\_\_\_\_\_

2. What was significant about the discovery of the iron oxide bands in the sedimentary layers?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. Describe the theory of endosymbiosis. \_\_\_\_\_

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\_\_\_\_\_

4. Why did the process of evolution seem to slow down 750 to 570 million years ago?

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5. What was special about the Cambrian Explosion?

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6. Describe several adaptations essential for the invasion of plants onto land.

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***Scientific Hypothesis for the origin of life***

- a. The first cells may have originated by chemical evolution on a young Earth.
- b. Abiotic synthesis of organic monomers is a testable hypothesis.
- c. Laboratory simulations of early-Earth conditions have produced organic polymers.
- d. RNA may have been the first genetic material.
- e. Protobionts can form by self-assembly.
- f. Natural selection could refine protobionts containing hereditary information.
- g. Debate about the origin of life abounds.

8. Describe the hypothesized conditions on earth when life arose. \_\_\_\_\_

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9. What did Louis Pasteur demonstrate with his experiment? \_\_\_\_\_

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10. List the four stages for the formation of life.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

d. \_\_\_\_\_

11. What metabolic processes would you expect to see in protobionts?

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12. Discuss evidence which supports current theories that RNA was the first genetic code?

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13. What did Oparin, Haldane, Miller and Urey accomplish?

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14. What are some of the possible locations for the first life forms?

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15. What is the basis of the classification system developed by Linnaeus?

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16. Why is the field of taxonomy considered a true work in progress?

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17. What are two problems with the five kingdom system of classification?

a. \_\_\_\_\_

b. \_\_\_\_\_

18. How has the domain system altered our view of taxonomy?

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19. Which prokaryote is closer to the eukaryotes? List several reasons for your answer.

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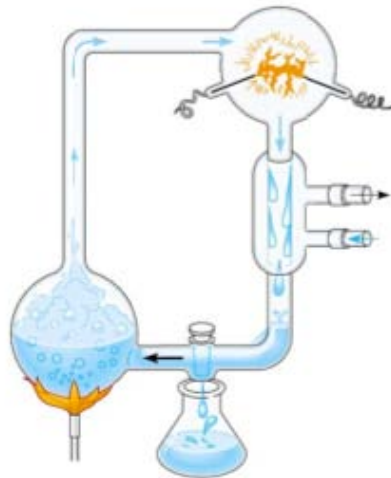
20. Place the following metabolic processes in the sequence that correlates with hypothesis which describe the origin of life: Photosynthesis, Aerobic Respiration, Fermentation, Nucleic Acid replication (RNA or DNA), Membrane transport.

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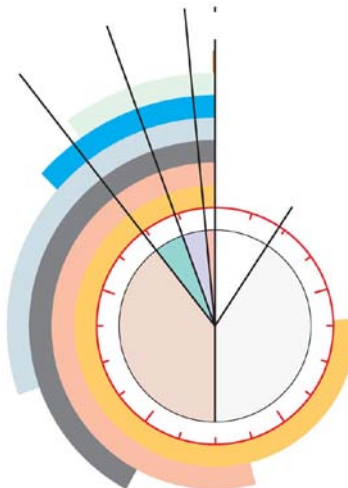
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21. Label the diagram to explain Miller and Urey's experiment designed to test the Abiotic Synthesis Hypothesis.



22. Label the diagram to indicate the major events, time frame, and geologic eras of the origin of life on Earth.



**Chapter 27: Prokaryotes**

1. How common are prokaryotes on earth?

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2. How do bacterial cell walls differ from plant cell walls?

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3. How does the presence or absence of a cell wall aid in the classification of bacteria?

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4. List the methods of locomotion utilized by bacteria.

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5. Give an example of a stimulus and describe how bacteria react to that stimulus (taxis).

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6. Describe common methods of reproduction in bacteria.

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7. List three methods that can genetically modify bacteria.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

8. Identify and briefly define the four nutritional categories of bacteria.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

d. \_\_\_\_\_

9. How has molecular systematics lead to classifying prokaryotes into two domains?

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10. What is the ecological significance of prokaryotes?

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11. Using Table 27.2 on page 541 and the information in the text, outline the key characteristics that distinguish the three domains.

<i>Domain</i>	<i>Characteristics</i>	<i>Example</i>

### Chapter 28: Protists

1. Why are Protists said to be the most diverse of all eukaryotes?

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2. What process is thought to be involved in the genesis of eukaryotes from prokaryotes?

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3. Define serial endosymbiosis.

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4. Why do most systematists currently working on eukaryotic relationships consider Kingdom Protista and the five kingdom system obsolete?

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**Chapters 29 and 30: Plant Diversity**

1. Chart the four phyla of the plant kingdom. Include common names of each, the approximate number of extant species, and the major characteristics.

a. \_\_\_\_\_

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b. \_\_\_\_\_

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c. \_\_\_\_\_

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d. \_\_\_\_\_

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2. Why are Charophyceans thought to be ancestors of land plants?

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9. How is the reduced gametophyte an adaptation for seeded plants?

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10. What is the significance of the seed?

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11. What was the advantage of pollen?

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12. List the four phyla of gymnosperms. Which is the most common?

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13. Identify five differences between monocots and dicots.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

d. \_\_\_\_\_

e. \_\_\_\_\_

14. Label the structures on this idealized flower:



15. What is the adaptive value of flowers to plants? \_\_\_\_\_

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16. Describe the role of ovaries and ovules in the flowering plants.

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17. List several features of angiosperms that aid in seed dispersal.

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## CHAPTER 31

1. How do fungi acquire nutrients?

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2. Because of this mode of nutrition, fungi have evolved what structure to provide for both extensive surface area and rapid growth?

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3. How do the cell walls of fungi differ from the cell walls of plants?

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4. How do fungi contribute to an ecosystem?

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5. Give some examples of how fungi are important to humans.

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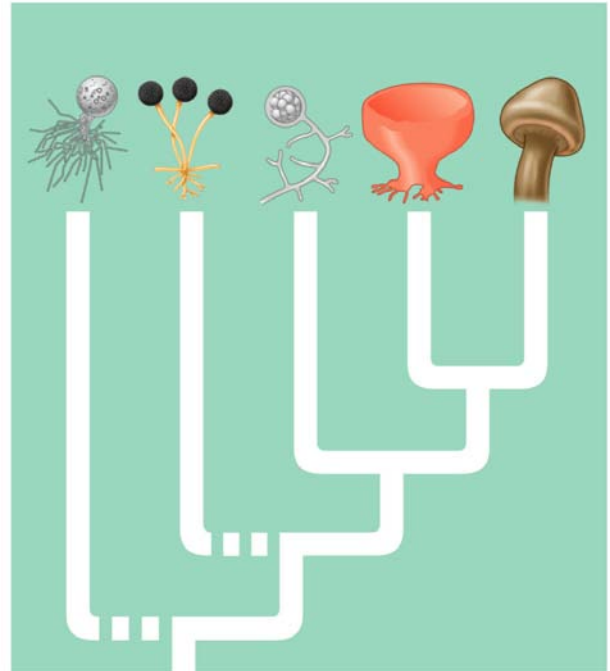


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6. **Directions:** Using Figure 31.9 on page 613 and the information in the text, label the diagram, and outline the key characteristics of each branch of the Kingdom Fungi identified on the diagram. *Include several examples of organisms in each division.*



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<i>Branch</i>	<i>Characteristics</i>	<i>Examples</i>

**Chapter 32: Introduction to Animal Diversity**

1. Outline the major characteristics Campbell uses to define an animal. 5

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2. List a hypothesis for the origin of animals.

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3. Describe the two forms of symmetry found within members of Eumetazoa.

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4. What is the significance of cephalization as an evolutionary trend?

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5. How do the germ layers of Radiata and the other Eumetazoa differ?

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**6. Define the following terms and describe their significance in classifying animals.**

a. Acoelomates

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b. Pseudocoelomates

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c. Coelomates

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d. Protostomes

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e. Deuterostomes

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f. spiral, determinate cleavage

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g. radial, indeterminate cleavage

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h. blastopore

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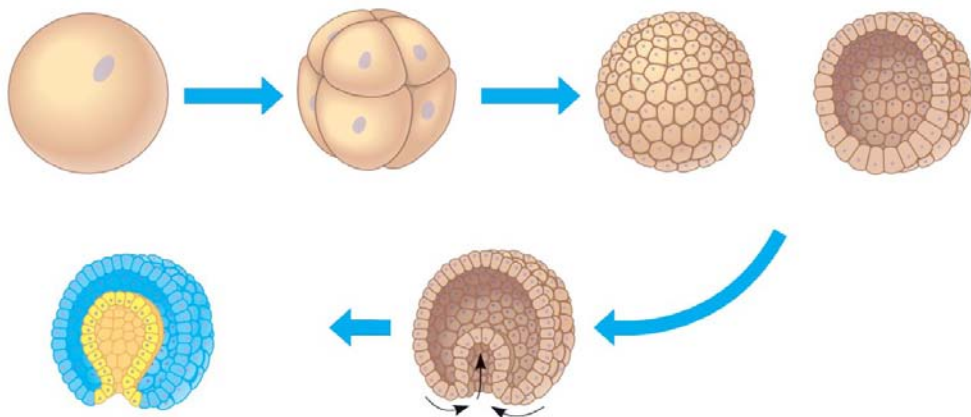
7. List several of the major differences between Protostomes and Deuterostomes.

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8. Label the stages of early embryonic development of animals.



### Chapter 33: Invertebrates

1. How does the structure of a sponge relate to its method of nutrition?

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2. What is a unique characteristic common to the Cnidarians?

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3. What are the two forms of shape within the Cnidarians?

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4. What are some evolutionary advancements present in phylum Platyhelminthes?

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5. In what way are Platyhelminthes significant to humans?

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6. Define parthenogenesis.

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7. What is unique in the structure and function of the Pseudocoelomates?

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8. List ways in which Nematodes impact humans.

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9. List common examples that could be classified as Coelomate Protostomes.

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10. What are the three major body regions of a Mollusk?

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11. Why do zoologists debate the widely accepted relationship of Mollusks and Annelids?

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12. What is the evolutionary significance of the coelom as seen in the Annelids?

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13. What is the importance of segmentation?

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14. Why are Arthropods regarded as the most successful of all animal phyla?

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15. Identify a characteristic that was most significant to Arthropod success.

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16. List common examples that could be classified as Coelomate Deuterostomes.

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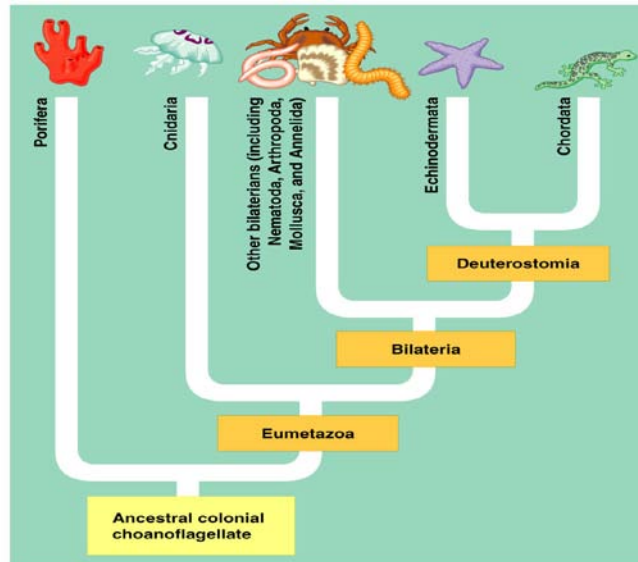
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17. What traits are particularly unique to Echinoderms?

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18. Using figure 33.2 and 33.3 on pages 638-641 and the information in the text, list the relative diversity, distinguishing characteristics and examples of each major invertebrate phylum.



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<i>Phylum</i>	<i>Relative Diversity</i>	<i>Characteristics</i>	<i>Examples</i>
Porifera			
Cnidaria			
Placozoa			
Kinorhyncha			
Platyhelminthes			
Rotifera			
Ectoprocta			
Phoronida			

<i>Phylum</i>	<i>Relative Diversity</i>	<i>Characteristics</i>	<i>Examples</i>
Nemertea			
Acanthocephala			
Ctenophora			
Mollusca			
Brachiopoda			
<i>Annelida</i>			
Loricifera			
Priapula			
Nematoda			
Arthropoda			
Cycliophora			
Tardigrada			
Onychophora			

<i>Phylum</i>	<i>Relative Diversity</i>	<i>Characteristics</i>	<i>Examples</i>
<b>Hemichordata</b>			
<b>Echinodermata</b>			
<b>Chordata</b>			

**Chapter 34: Vertebrates**

1. What are the four characteristics of the Chordates?

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2. Describe an example of an invertebrate chordate.

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3. Define paedogenesis.

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4. What characterizes the subphylum Vertebrata?

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5. In the evolution of vertebrates, identify the significance of being tetrapod.

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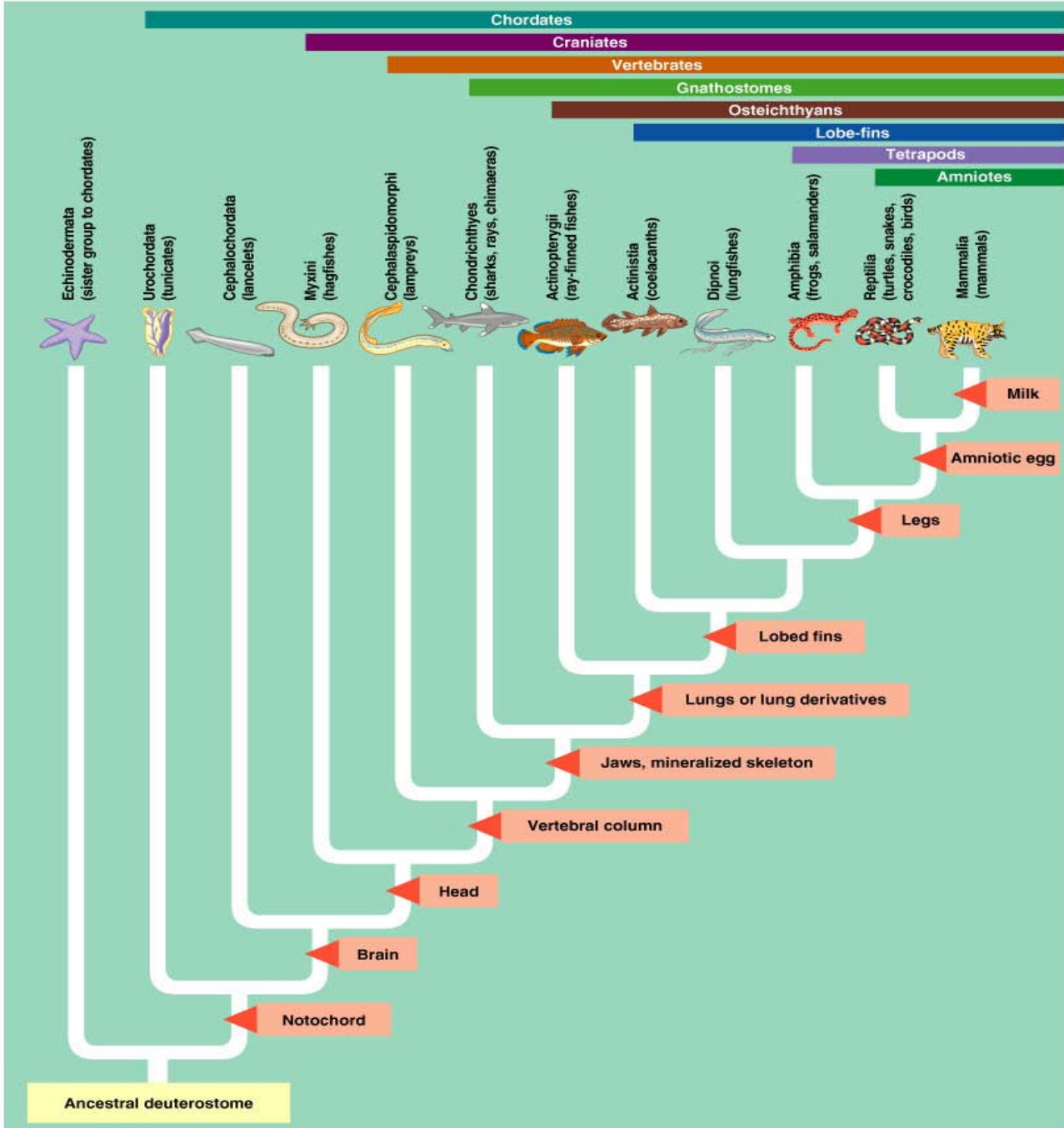


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6. Identify the significance of the amniotic egg and the amniote.

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7. Using Table 34.2 on page 672 as well as the information in the text, outline the key characteristics that distinguish the major branches of the Subphylum Vertebrata identified on the diagram. Include examples of organisms in each class. **Exclude Urochordata and Cephalocordata.**



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<i>Divisions of Subphylum Vertebrata</i>	<i>Characteristics</i>	<i>Examples</i>
<b>Myxini</b>		
<b>Cephalospidomorphi</b>		
<b>Chondrichthyes</b>		
<b>Actinopterygii</b>		
<b>Actinista</b>		
<b>Dipnoi</b>		
<b>Amphibia</b>		
<b>Reptilia</b>		
<b>Mammalia</b>		