Name _____ Class _____ Date _____

18.3 Building the Tree of Life

Lesson Objectives

- Name the six kingdoms of life as they are currently identified.
- Explain what the tree of life represents.

Lesson Summary

Changing Ideas About Kingdoms As biologists learned more about the natural world, they realized that Linnaeus's two kingdoms, Animalia and Plantae, did not represent all life.

- Researchers found that microorganisms were very different from plants and animals. They were placed in their own kingdom, called Protista.
- Then, yeast, molds, and mushrooms were separated from plants and placed in their own kingdom, called Fungi.
- Because bacteria lack nuclei, mitochondria, and chloroplasts, they were separated from Protista and placed in another new kingdom, called Monera.
- In the 1990s, kingdom Monera was divided into two kingdoms: Eubacteria and Archaebacteria. The six-kingdom system of classification includes the kingdoms Eubacteria, Archaebacteria, Protista, Fungi, Plantae, and Animalia.
- Genetic analysis revealed that two prokaryotic groups are even more different from each other, and from Eukaryotes, than previously thought. This discovery lead to the creation of a new taxon, called the domain. The **domain** is a larger, more inclusive category than a kingdom. The three domain system consists of: Bacteria, Archaea, and Eukarya.
- Domain Bacteria corresponds to the kingdom Eubacteria. Domain Archaea corresponds to the kingdom Archaebacteria. Domain Eukarya corresponds tokingdoms Fungi, Plantae, Animalia, and "Protista."
- Quotations are used for the old kingdom Protista to signify that it is not a valid clade.

The Tree of All Life The tree of life shows current hypotheses regarding evolutionary relationships among taxa within the three domains of life.

- The domain **Bacteria** includes unicellular organisms without a nucleus. They have cell walls containing a substance called peptidoglycan.
- The domain **Archaea** also includes unicellular organisms without a nucleus. These organisms have cell walls that do not contain peptidoglycan.
- The domain **Eukarya** includes the four remaining kingdoms: "Protista," Fungi, Plantae, and Animalia. All members of the domain Eukarya have cells with a nucleus.
  - Most members of the kingdom "Protista," are unicellular organisms. Some Protista are photosynthetic; others are heterotrophs.
  - Most members of the kingdom Fungi are multicellular, and all members of this kingdom are heterotrophs with cell walls containing chitin.
  - All members of the kingdom Plantae are multicellular and photosynthetic. Most plants cannot move about, and their cells have cell walls.
  - All members of the kingdom Animalia are multicellular heterotrophs. Most animals can move about, and their cells lack cell walls.

Name _____ Class _____ Date _____

Changing Ideas About Kingdoms

1. What fundamental traits did Linnaeus use to separate plants from animals?

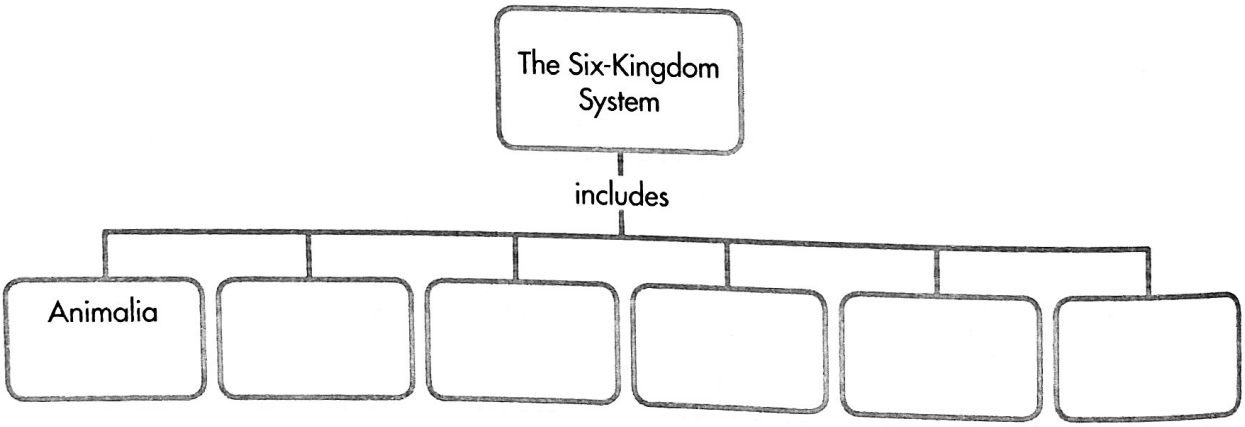
2. What types of organisms were first placed in the kingdom Protista?

3. What types of organisms were placed into the kingdom Fungi?

4. Why did scientists place bacteria in their own kingdom, the Monera?

5. What two kingdoms was kingdom Monera separated into?

6. Complete the concept map.



7. What is a domain?

8. What did genomic analysis reveal about the two prokaryotic groups?

9. Complete the chart below.

Classification of Living Things		
Domain	**Kingdom**	**Examples**
	Eubacteria	*Salmonella typhimurium*
Archaea		*Sulfolobus archaea*
	"Protista"	
		mushrooms, yeasts
	Plantae	
		Sponges, worms, insects, fishes, mammals

Match the kingdom with the description that applies to members of that kingdom.

Kingdom

_____ **10.** "Protista"

_____ **11.** Fungi

_____ **12.** Plantae

_____ **13.** Animalia

Description

A. They feed on dead or decaying organic matter.

B. They have no cell walls and they move about.

C. They are a "catchall" group of eukaryotes.

D. They include mosses and ferns.

Apply the Big idea

14. What characteristics led camels to be classified in the same domain, kingdom, phylum, and class as dogs?

Name _____ Class _____ Date _____

Chapter Vocabulary Review

Match the term with its definition.

Term

_____ **1.** phylogeny
_____ **2.** Bacteria
_____ **3.** order
_____ **4.** phylum
_____ **5.** clade
_____ **6.** class
_____ **7.** Eukarya
_____ **8.** domain

Definition

A. The domain containing all organisms that have a nucleus

B. The domain containing organisms that are prokaryotic and unicellular

C. A group of classes

D. A group of orders

E. A group of families

F. A group of species that includes a single common ancestor and all descendents of that ancestor

G. A larger, more inclusive category than a kingdom

H. The study of how living and extinct organisms are related to one another

For Questions 9–18, complete each statement by writing the correct word or words.

9. Members of the domain _____ live in some of the most extreme environments on Earth.

10. A(n) _____ is a trait that arose in the most recent common ancestor of a particular lineage, and was passed along to its descendants.

11. Multicellular organisms that move about are placed in the _____ Animalia.

12. Under Linnaeus' classification system, similar genera were placed into a larger category called a(n) _____.

13. Families, Orders, Classes, and Phyla are all _____.

14. The science of naming and grouping organisms is called _____.

15. A(n) _____ shows relative degrees of relatedness among lineages.

16. The name *Ursus arctos* is an example of the two-part scientific name given in the _____ system.

17. A(n) _____ is a group of similar species.

18. A clade is made up of a(n) _____.

