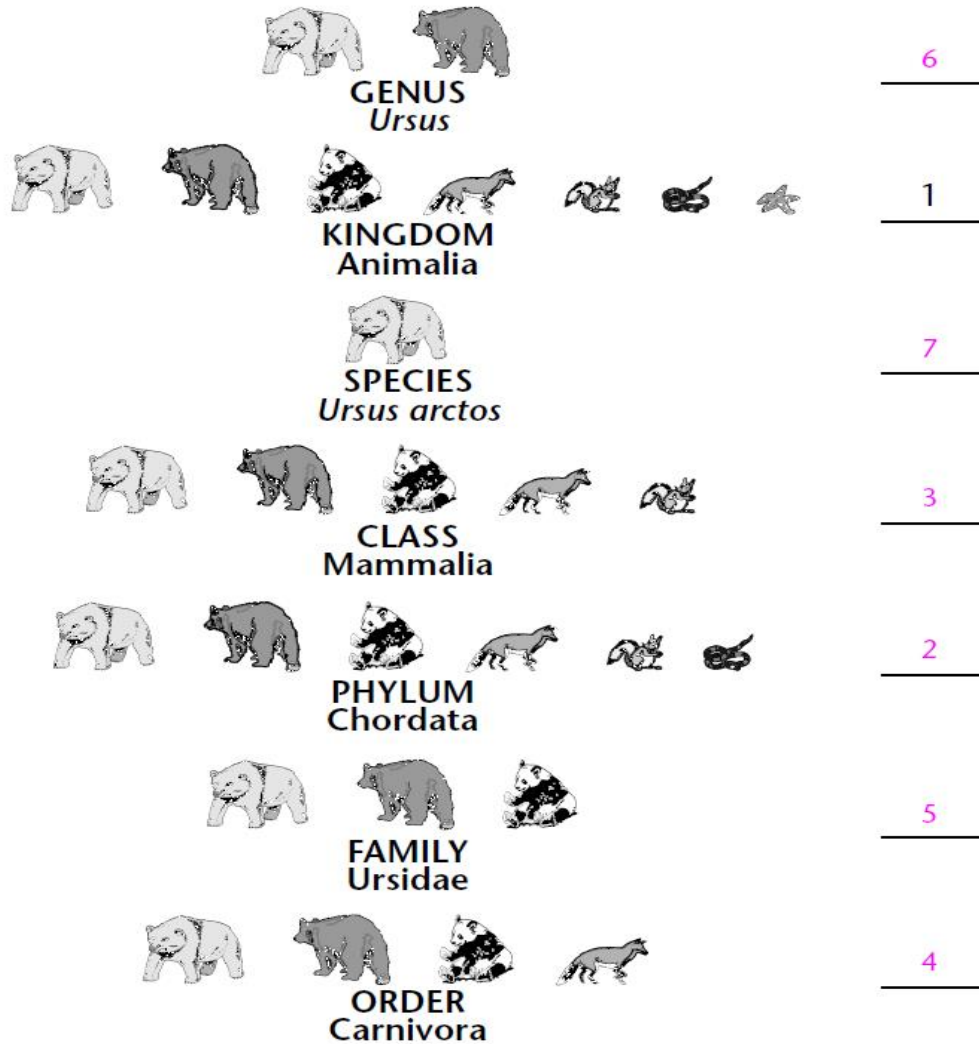


## Linnaeus's System of Classification

Linnaeus developed a system of classification to name and group organisms in a logical manner. This made it easier to study the many forms of life.

The diagrams show the classification of a grizzly bear, but the items are out of order. Number the groups from largest (1) to smallest (7). The first one has been done for you.



Use the diagram to answer the question.

- Using binomial nomenclature, what is the scientific name of the grizzly bear?

*Ursus arctos*

## Three Domains

All organisms belong to one of three domains, depending on their characteristics. A domain is the most inclusive taxonomic category. A single domain can contain one or more kingdoms.

Write each of the following domain names in the correct place in the table: Bacteria, Archaea, and Eukarya.

Three Domains		
Domain	Organism Characteristics	Kingdoms Included in Domain
Bacteria	Prokaryotes with cell walls made up of peptidoglycan	Eubacteria
Eukarya	Eukaryotes	Protista, Fungi, Plantae, Animalia
Archaea	Prokaryotes whose cell walls do not contain peptidoglycan and whose cell membranes contain unusual lipids	Archaeobacteria

Answer the questions.

1. Which domains are composed of unicellular organisms only?

Bacteria and Archaea

2. To which domain do organisms whose cells contain nuclei belong?

Eukarya

3. To which domain does the kingdom Eubacteria belong?

Bacteria

## Chapter 18 Classification

# Vocabulary Review

**Hidden Word** Use the clues and the words below to write the correct vocabulary term in the blanks.

cladogram	Eubacteria	genus	phylogeny
domain	family	kingdom	taxonomy

### Clues

1. kingdom that makes up the domain Bacteria

E u (b) a c t e r i a

2. largest and most inclusive taxon in Linnaeus's system

k (i) n g d o m

3. a group of closely related species g e (n) u s

4. science of classifying and naming living things

t a x (o) n o m y

5. newest and largest classification category d o (m) a i n

6. group of genera that share many characteristics

f a m (i) l y

7. diagram that shows evolutionary relationships among a group of organisms c l a d o g r (a) m

8. the study of evolutionary relationships among organisms

p h y (l) o g e n y

Write the circled letter in each term in the spaces provided to reveal a type of nomenclature studied in the chapter.

**Hidden Word:** b i n o m i a l

Write a description of this type of nomenclature.

**Description:** Binomial nomenclature is a system of naming in which organisms are given names made up of two parts. These two parts are the genus name and the species name.

**Chapter 18 Classification****Section 18–1 Finding Order in Diversity** (pages 447–450)

This section explains how living things can be organized for study.

**Why Classify?** (page 447)





























1. Why do biologists use a classification system to study the diversity of life?  
They use it to name organisms and group them in a logical manner.
2. The science of classifying organisms and assigning them universally accepted names is known as taxonomy.
3. Is the following sentence true or false? In a good system of classification, organisms placed into a particular group are less similar to each other than they are to organisms in other groups. false

**Assigning Scientific Names** (page 448)

4. Why is it confusing to refer to organisms by common names? Common names vary among languages and even among regions within a single country. Furthermore, different species can share a single common name.
5. Circle the letter of each sentence that is true about early efforts at naming organisms.
  - a. Names were usually in English.
  - b. Names often described detailed physical characteristics of a species.
  - c. Names could be very long.
  - d. It was difficult to standardize the names.
6. The two-word naming system developed by Linnaeus is called binomial nomenclature.
7. Circle the letter of each sentence that is true about binomial nomenclature.
  - a. The system is no longer in use today.
  - b. Each species is assigned a two-part scientific name.
  - c. The scientific name is always written in italics.
  - d. The second part of the scientific name is capitalized.
8. What is the genus of the grizzly bear, *Ursus arctos*? The genus is *Ursus*.

## Linnaeus's System of Classification (pages 449–450)

9. A group or level of organization in taxonomy is called a taxonomic category, or taxon.
10. The largest taxonomic category in Linnaeus's system of classification is the kingdom, and the smallest is the species.
11. What two kingdoms did Linnaeus name? He named the Animalia and Plantae kingdoms.
12. Fill in the name of each missing taxonomic category in the chart below.

Grizzly bear	Black bear	Giant panda	Red fox	Abert squirrel	Coral snake	Sea star	
							<b>KINGDOM</b> Animalia
							<b>PHYLUM</b> Chordata
							<b>CLASS</b> Mammalia
							<b>ORDER</b> Carnivora
							<b>FAMILY</b> Ursidae
							<b>GENUS</b> <i>Ursus</i>
							<b>SPECIES</b> <i>Ursus arctos</i>

## Section 18–2 Modern Evolutionary Classification (pages 451–455)

*This section explains how evolutionary relationships are important in classification. It also describes how DNA and RNA can help scientists determine evolutionary relationships.*

### Introduction (page 451)

1. What traits did Linnaeus consider when classifying organisms? He tried to group organisms according to biologically important characteristics.

### Which Similarities Are Most Important? (page 451)

2. What problems are faced by taxonomists who rely on body-structure comparisons? It is difficult to decide which similarities and differences are most important.

### Evolutionary Classification (page 452)

3. Is the following sentence true or false? Darwin's theory of evolution changed the way biologists thought about classification. true
4. How do biologists now group organisms into categories? They group them into categories that represent lines of evolutionary descent, not just physical similarities.
5. Is the following sentence true or false? Genera placed within a family should be less closely related to one another than to members of any other family. false
6. The strategy of grouping organisms together based on their evolutionary history is called evolutionary classification.

### Classification Using Cladograms (page 453)

7. Circle the letter of each sentence that is true about cladistic analysis.
- a. It considers only traits that are evolutionary innovations.
  - b. It considers all traits that can be measured.
  - c. It considers only similarities in body structure.
  - d. It is a method of evolutionary classification.
8. Characteristics that appear in recent parts of a lineage, but not in its older members, are called derived characters.

9. A diagram that shows the evolutionary relationships among a group of organisms is called a(an) cladogram.
10. Is the following sentence true or false? Derived characters are used to construct a cladogram. true

### Similarities in DNA and RNA (page 454)

11. Is the following sentence true or false? Some organisms do not have DNA or RNA.  
false
12. How do similarities in genes show that humans and yeasts share a common ancestry?  
Both humans and yeasts have a gene that codes for a myosin protein. This similarity at the molecular level indicates a shared common ancestry.

### Molecular Clocks (page 455)

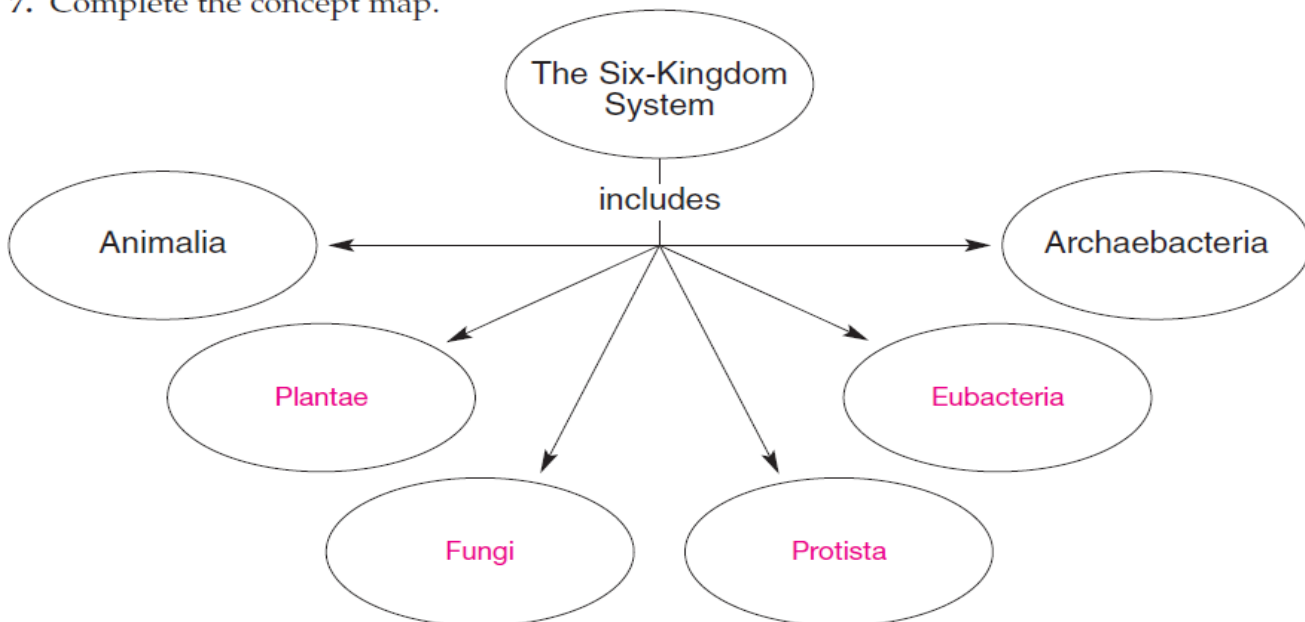
13. A model that uses DNA comparisons to estimate the length of time that two species have been evolving independently is known as a(an) molecular clock.
14. A molecular clock relies on the repeating process of mutations.
15. Why are only neutral mutations useful for molecular clocks? Neutral mutations accumulate in the DNA of different species at about the same rate because they are unaffected by natural selection.
16. Is the following sentence true or false? The degree of dissimilarity in DNA sequences is an indication of how long ago two species shared a common ancestor.  
true
17. Why are there many molecular clocks in a genome instead of just one?  
Some genes accumulate mutations faster than others.

## Section 18–3 Kingdoms and Domains (pages 457–461)

This section describes the six kingdoms of life as they are now identified. It also describes the three-domain system of classification.

### The Tree of Life Evolves (pages 457–458)

- Is the following sentence true or false? The scientific view of life was more complex in Linnaeus's time. false
- What fundamental traits did Linnaeus use to separate plants from animals?  
Animals were mobile organisms that used food for energy. Plants were green, photosynthetic organisms that used energy from the sun.
- What type of organisms were later placed in the kingdom Protista?  
Microorganisms were later placed in this kingdom.
- Mushrooms, yeast, and molds have been placed in their own kingdom, which is called Fungi.
- Why did scientists place bacteria in their own kingdom, the Monera? Bacteria lack the nuclei, mitochondria, and chloroplasts found in other forms of life.
- List the two groups into which the Monera have been separated.
  - Eubacteria
  - Archaeobacteria
- Complete the concept map.





## The Three-Domain System (page 458)

8. A more inclusive category than any other, including the kingdom, is the domain.
9. What type of analyses have scientists used to group modern organisms into domains? They have used molecular analyses.
10. List the three domains.
- Bacteria
  - Archaea
  - Eukarya
11. Complete the chart below.

### CLASSIFICATION OF LIVING THINGS

Domain	Kingdom	Examples
Bacteria	Eubacteria	<i>Streptococcus, Escherichia coli</i>
Archaea	Archaeobacteria	Methanogens, halophiles
Eukarya	Protist	Amoeba, paramecium, slime molds, giant kelp
	Fungi	Mushrooms, yeasts
	Plantae	Mosses, ferns, flowering plants
	Animalia	Sponges, worms, insects, fishes, mammals

## Domain Bacteria (page 459)

12. Circle the letter of each sentence that is true about members of the domain Bacteria.
- They are multicellular.
  - They are prokaryotes.
  - They have rigid cell walls.
  - The cell walls contain peptidoglycans.
13. Is the following sentence true or false? All members of the domain Bacteria are parasites. false

**Domain Archaea** (page 459)

14. Circle the letter of each sentence that is true about members of the domain Archaea.
- a. They are unicellular.
  - b. They are eukaryotes.
  - c. They lack cell walls.
  - d. They lack cell membranes.
15. Is the following sentence true or false? Many members of the domain Archaea can survive only in the absence of oxygen.           true

**Domain Eukarya** (pages 460–461)

16. Circle the letter of each sentence that is true about all the members of the domain Eukarya.
- a. They have a nucleus.
  - b. They are multicellular.
  - c. They are heterotrophs.
  - d. They have cell walls and chloroplasts.

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

	<b>Kingdom</b>	<b>Description</b>
<u>  c  </u>	17. Protista	a. They have cell walls of chitin.
<u>  a  </u>	18. Fungi	b. They have no cell walls or chloroplasts.
<u>  d  </u>	19. Plantae	c. They include slime molds and giant kelp.
<u>  b  </u>	20. Animalia	d. They include mosses and ferns.