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STUDY GUIDE

CHAPTER 15
Classification Systems

Section 15–1 Why Classify? *(pages 319–320)*

SECTION REVIEW

In this section you discovered that there are more than 2 ½ million species of organisms on Earth. In order to study and understand this great diversity of organisms, scientists must name them and divide them into categories in a logical manner. In other words, they must classify them. Good classification systems have two important characteristics: (1) They are universally accepted, and (2) they place organisms into groups that have real biological meaning.

Making the Rules: Understanding the Main Ideas

Explain why each of the following characteristics of a classification system is important.

1. It assigns a single universally accepted name to each organism. _____

2. It places organisms into groups that have real biological meaning. _____

3. It divides organisms into small groups. _____

Concept Mapping

The construction of and theory behind concept mapping are discussed on pages vii–ix in the front of this Study Guide. Read those pages carefully. Then consider the concepts presented in Section 15–1 and how you would organize them into a concept map. Now look at the concept map for Chapter 15 on page 154. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 15–1. When you have finished the chapter, you will have a completed concept map.

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Section 15–2 Biological Classification

(pages 320 – 323)

SECTION REVIEW

About 200 years ago, European scientists stopped using common names in local languages to describe organisms. Instead, they started a practice that is continued today: They used names based on Latin or ancient Greek words because those languages were understood by educated people everywhere. Unfortunately, many of the early naming systems were quite cumbersome and difficult to standardize.

As you learned in this section, the Swedish botanist Carolus Linnaeus devised a system for naming organisms. This system, known as binomial nomenclature, soon gained wide acceptance and is still in use today.

In addition to giving each organism a two-part scientific name, Linnaeus placed organisms into groups based on shared body structures. These groups are known as taxa. The taxa are, in order from largest to smallest, kingdom, phylum, class, order, family, genus, species.

Completing Sentences: Building Vocabulary Skills

In the space provided, write the term that best fits each of the following sentences.

1. In _____, an organism is given a two-part scientific name that gives the organism's genus and species.
2. The science of naming organisms and putting them into classification groups is known as _____.
3. _____ devised a system of naming organisms that is still in use today.
4. Organisms are placed in _____, or classification groups.
5. The taxon that is larger than a genus and smaller than an order is a (an) _____.
6. The smallest taxon is the _____, which is made up of organisms that share similar characteristics and can breed with one another.

Devising Mnemonics: Remembering the Main Ideas

A mnemonic (nee-MAHN-ihk) device is a rhyme or phrase that helps you remember an important date, fact, or list of items. One that you may be familiar with is, "In 1492, Columbus sailed the ocean blue." A mnemonic device for taxonomy used by generations of biology students is, "Kings play chess on fine green sand." The words in this nonsensical sentence begin with the same letters of the taxa listed from largest to smallest.

In the space provided, invent two mnemonics of your own for the seven taxa.

1. _____

_____

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2. _____

_____

Putting It Together: Using the Main Ideas

Using the information in this section and elsewhere in the textbook, complete the accompanying table. (*Hint:* Use the index in the back of the textbook to help you find information.)

Classification of the Common House Cat	
Taxon	**Taxon Characteristics**
Kingdom:	
Phylum:	
Class:	
Order:	
Family:	
Genus:	
Species:	

Concept Mapping

The construction of and theory behind concept mapping are discussed on pages vii–ix in the front of this Study Guide. Read those pages carefully. Then consider the concepts presented in Section 15–2 and how you would organize them into a concept map. Now look at the concept map for Chapter 15 on page 154. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 15–2. When you have finished the chapter, you will have a completed concept map.

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Section 15–3 Taxonomy Today *(pages 323–325)*

SECTION REVIEW

In this section you discovered that taxonomy is not as simple as it seems. Although the taxa above the level of species are useful in organizing information about living things, they do not have a clear biological identity. Thus it is difficult to draw the lines between groups. Taxonomists now try to group organisms in ways that reflect their evolutionary relationships. This means that they must examine similarities among organisms more closely and distinguish between analogous and homologous structures. Unlike the taxonomists of Linnaeus's time, modern taxonomists study more than the visible characteristics of organisms. They also examine the chemical compounds in living things. Similarities and differences in these compounds provide clues about evolutionary relationships.

Explaining Concepts: Understanding the Main Ideas

1. Explain why taxonomists may not agree on the classification of an organism.

_____

_____

_____

_____

_____

2. List three sources of information that taxonomists use in determining evolutionary relationships between groups of organisms. _____

_____

_____

_____

_____

_____

Concept Mapping

The construction of and theory behind concept mapping are discussed on pages vii–ix in the front of this Study Guide. Read those pages carefully. Then consider the concepts presented in Section 15–3 and how you would organize them into a concept map. Now look at the concept map for Chapter 15 on page 154. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 15–3. When you have finished the chapter, you will have a completed concept map.

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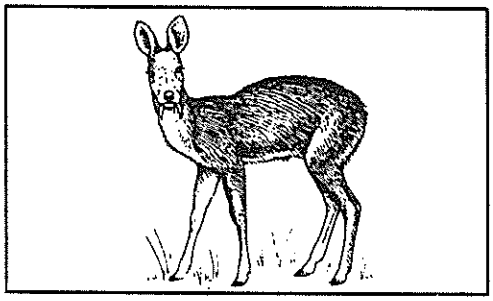
Section 15–4 The Five-Kingdom System (pages 325–329)

SECTION REVIEW

As biologists accumulated more information about living things in the centuries after Linnaeus devised his classification system, it became clear that more than two kingdoms were needed to categorize organisms logically. Today, the most generally accepted classification system contains five kingdoms: Monera, Protista, Fungi, Plantae, and Animalia. Prokaryotes are placed in the kingdom Monera. Single-celled eukaryotes belong to the kingdom Protista. (However, a few single-celled eukaryotes are often grouped with fungi or plants.) The kingdom Fungi contains heterotrophic eukaryotes whose cell walls do not contain cellulose and may not completely separate the individual cells. The kingdom Plantae contains multicellular photosynthetic autotrophs whose cell walls contain cellulose. Multicellular heterotrophs whose cells lack cell walls are placed in the kingdom Animalia.

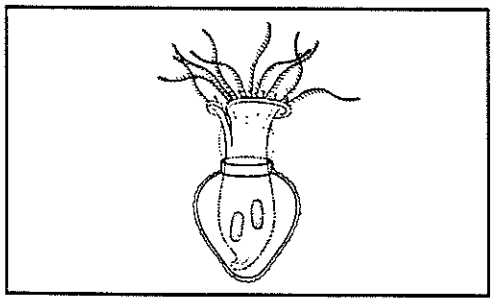
Classifying Organisms: Building Vocabulary Skills

Examine the accompanying illustrations and descriptions of organisms. Underline the information in the description that allows you to identify the kingdom to which each organism belongs. In the space provided, write the name of the kingdom.



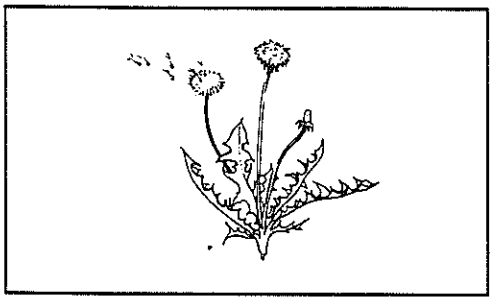
1. Musk deer: Endangered; lives in Asia; lacks cell walls; eats plants; produces musk, which is used in perfumes; males have long canine teeth

   Kingdom: _____



2. *Tintinnopsis:* Microscopic; feeds with brushes made up of fused cilia; unicellular; surrounded by a jellylike coat; possesses two large nuclei

   Kingdom: _____



3. Dandelion: Cell walls contain cellulose; seeds dispersed by the wind; photosynthetic; yellow flowers; made up of many cells; eukaryote

   Kingdom: _____

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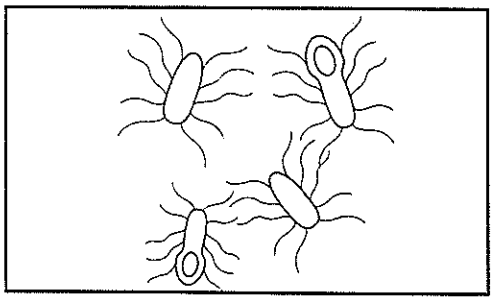
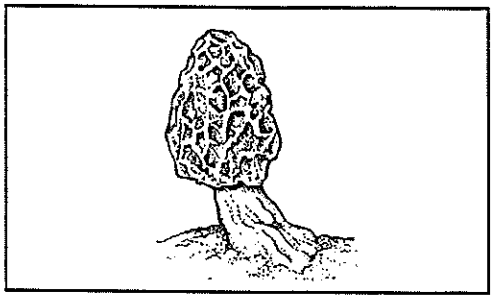


4. *Clostridium tetani:* Rod-shaped; internal spores make some cells drumstick-shaped; lacks a nucleus; produces a toxin that causes tetanus (lockjaw)

   Kingdom: _____



5. Morel: Up to 10–15 centimeters high; blackish gray in color; spongelike in appearance; good to eat; cell walls contain chitin rather than cellulose

   Kingdom: _____

Comparing Kingdoms: Using the Main Ideas

Use the information in Section 15–4 to complete the following table.

Kingdom	Characteristics	Example
Animalia		
Fungi		
Monera		
Plantae		
Protista		

Concept Mapping

The construction of and theory behind concept mapping are discussed on pages vii–ix in the front of this Study Guide. Read those pages carefully. Then consider the concepts presented in Section 15–4 and how you would organize them into a concept map. Now look at the concept map for Chapter 15 on page 154. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 15–4. When you have finished the chapter, you will have a completed concept map.