



**High School  
Biology  
Packet 2  
Eytcheson**

**4TH QUARTER  
CURRICULUM PACKET**

**Hayward Community  
School District  
715-634-2619**

**#HurricaneStrong**



# Biology

## **Unit 7: Classification of Living Things**

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### Textbook References:

- Biology: Exploring Life: Chapter 15, Section 4, pages 341 – 348
- Exploring Life Science: Chapter 4, pages 105 - 123

### Projects and Activities:

- ✓ “Organizing a Junk Drawer” Activity
- ✓ History of Classification WS
- ✓ Classifying the States Activity
- ✓ Classification Today WS
- ✓ Classification of Mammals by Physical Characteristics WS
- ✓ Classification of Mammals by DNA Sequence WS
- ✓ The Five Kingdoms WS
- ✓ Unit 7 Test

### **Study Guide:**

#### Vocabulary:

- Binomial Nomenclature
- Genus
- Species
- Autotroph
- Heterotroph

#### Concepts:

- Give examples of the ways classification is used in science and in everyday life.
- Explain how binomial nomenclature is used to name living things.
- Relate biological classification to evolution.
- List the seven major classification groups.
- Describe some general characteristics of each of the five kingdoms.

**Standards**

25. Identify and explain how DNA sequencing and physical characteristics are used to classify organisms.
26. Explain how natural selection is the result of genetic variation, adaptation, competition, and the ability to reproduce.

## Classification of Living Things

Unit 7

## History of Classification

### What is Classification?

- The grouping of things according to similar characteristics.
- Used by scientists.
- Used by you.

### Why Classify?

- May have helped organisms to not become extinct.
- Provides ways to learn more about life and the relationships between types of life.

### How to Classify?

- Based on observable characteristics.
- System used must be meaningful, easy to understand, and easy to communicate.

### What Has Been Classified?

- 2.5 million different types of living things.
- Scientists estimate that there may be another 7 million yet to be discovered.

### Taxonomy

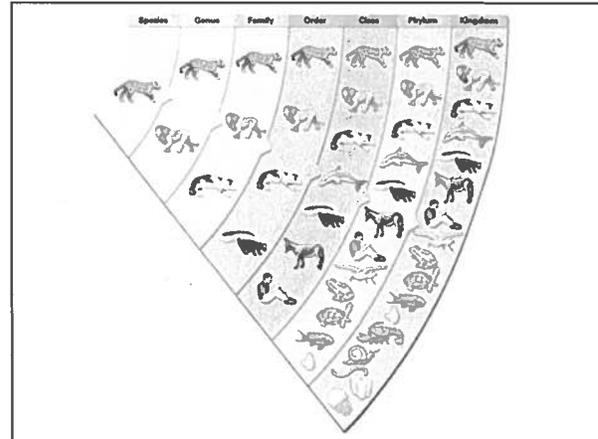
- The science of classification is called taxonomy.

### Aristotle's Classification System

- Two groups
  - Plants and animals
- Three more groups
  - Flying, swimming, walking
- Problem:
  - Bird and bat would have ended up in same category.

## Linnaeus

- Two groups
  - Plant and animal
- Grouped by similarities in form.
- System still used today.



## Naming Living Things

- Originally a description in Latin
  - Too long
  - Not universal
- Binomial nomenclature
  - Linnaeus
  - Binomial means two names
  - Nomenclature means system of naming

## Two Names

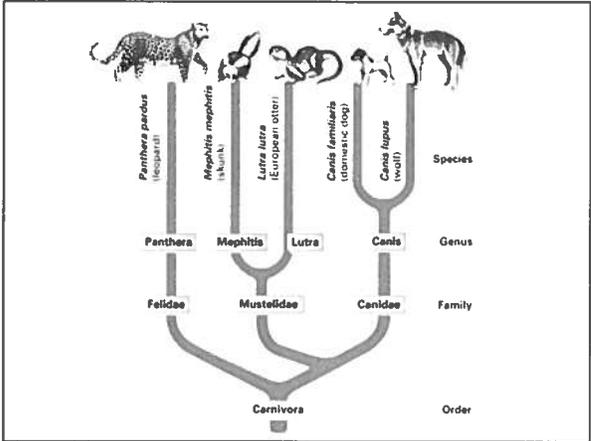
- *Genus* name is capitalized and printed in italics.
- *Species* name is not capitalized but printed in italics, too.
 

*Canis lupus*
- Each organism has only one scientific name and no two can have the same name.
  - This name is universal.

# Classification Today

- ## Largest Impact on Classification?
- Darwin's evolution theories.
  - Technological advancements in science.

- ## Evolution and Classification
- During the history of Earth organisms have changed or evolved.
  - Evolution is a process in which new organisms evolve from existing ones.
  - Natural selection
  - Taxonomists focus on evolutionary histories to group organisms.



## Natural Selection

- **Natural selection** is the gradual process by which biological traits become either more or less common in a population as a function of the effect of inherited traits on the differential reproductive success of organisms interacting with their environment. It is a key mechanism of evolution.

## Technology and Classification

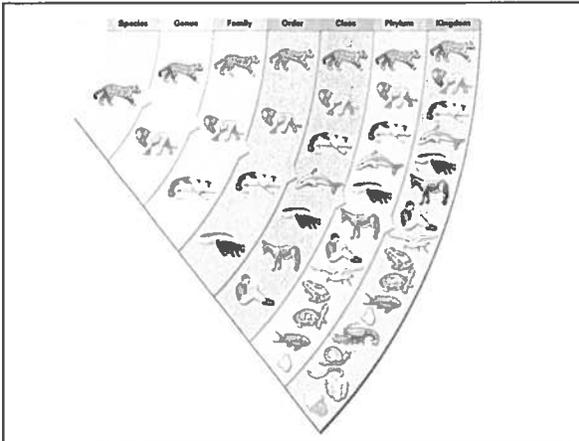
- Internal and external structure
  - Can be difficult due to individual interpretation of characteristics.
- Cell structure
- Chemical tests
- DNA analysis
  - Finding similar DNA sequences proves relationship between organisms.

## What Does Classification Do For Science?

- Give each organism a unique name.
- Groups organisms according to evolutionary relationships.
- Groups organisms according to genetic relationships.

## 7 Levels of Classification

- Kingdom
- Phylum
- Class
- Order
- Family
- Genus
- Species

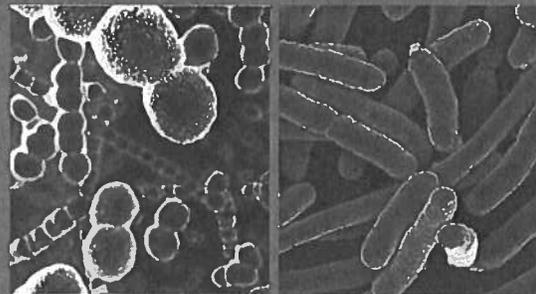


## The Five Kingdoms

### Kingdom Monera

- Bacteria
- All unicellular organisms.
- DNA not in nucleus.
- Characterized as being either an autotroph or a heterotroph.
  - Autotroph: an organism that is able to make its own food using the sun's energy.
  - Heterotroph: an organism that must consume other organisms to obtain energy.

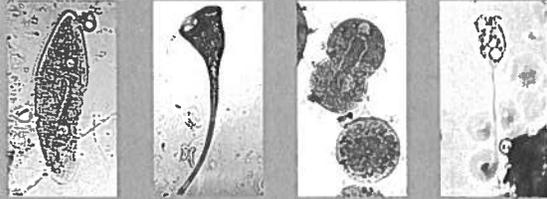
### Common Monerans



## Kingdom Protista

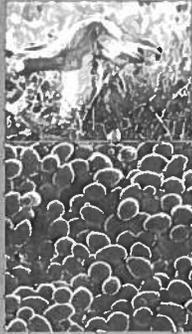
- All unicellular organisms with a nucleus.
- Some are plant-like and autotrophic.
- Some are animal-like and heterotrophic.

## Common Protista



## Kingdom Fungi

- Most are multicellular.
- All are heterotrophs.



## Kingdom Plantae

- Most are multicellular.
- All are autotrophs.



## Kingdom Animalia

- All are heterotrophs.
- All are multicellular.



## History of Classification

### **Key Concepts**

- Classification is the grouping of things according to similar characteristics.
- Biological classification systems name and organize living things in a logical, meaningful way.

### **Building Vocabulary Skills: Learning the Meaning**

Explain the actual meanings of the following words.

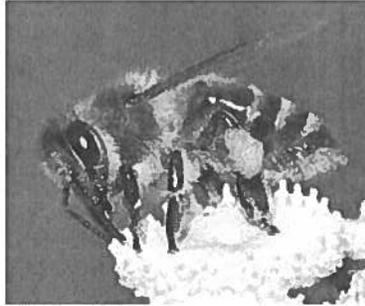
1. Binomial \_\_\_\_\_
2. Nomenclature \_\_\_\_\_
3. Now put words together and explain what biologists mean by the term binomial nomenclature. \_\_\_\_\_  
\_\_\_\_\_
4. What part of your own name corresponds to the *genus* name of an organism? \_\_\_\_\_
5. Do other people in the family share a "genus" name? \_\_\_\_\_
6. What part of your own name corresponds to the *species* name of an organism? \_\_\_\_\_
7. What is different about the order of names in *Genus species* and the way you usually write your signature in English? \_\_\_\_\_
8. Where might you find your name written in *Genus species* order? \_\_\_\_\_  
\_\_\_\_\_

Study the illustrations below. Label each part of the name "genus" or "species".



*Canis lupus*

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*Apis mellifera*

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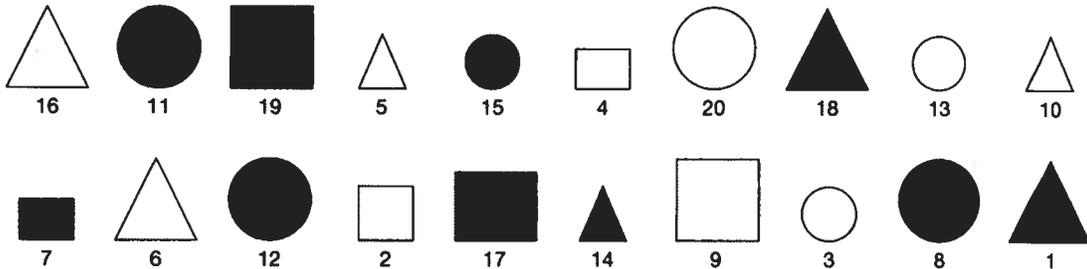


*Felis concolor*

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### Practicing Classification: Using the Main Ideas

Study the assortment of figures below. Devise a classification system to put the objects into two categories. List the numbers of the figures you selected in the space provided.



1. What figures did you put in Category #1? \_\_\_\_\_
2. What figures did you put in Category #2? \_\_\_\_\_
3. What was the basis of your classification system? \_\_\_\_\_  
\_\_\_\_\_

Perform the same activity putting the figures into three categories.

4. What figures did you place in Category #1? \_\_\_\_\_
5. What figures did you place in Category #2? \_\_\_\_\_
6. What figures did you place in Category #3? \_\_\_\_\_
7. What was the basis of your classification system? \_\_\_\_\_  
\_\_\_\_\_
8. If you compared your system with those of all your classmates, would they all be the same? \_\_\_\_\_
9. Have all biological classification systems been the same? \_\_\_\_\_
10. What conclusion can you draw from this information? \_\_\_\_\_  
\_\_\_\_\_



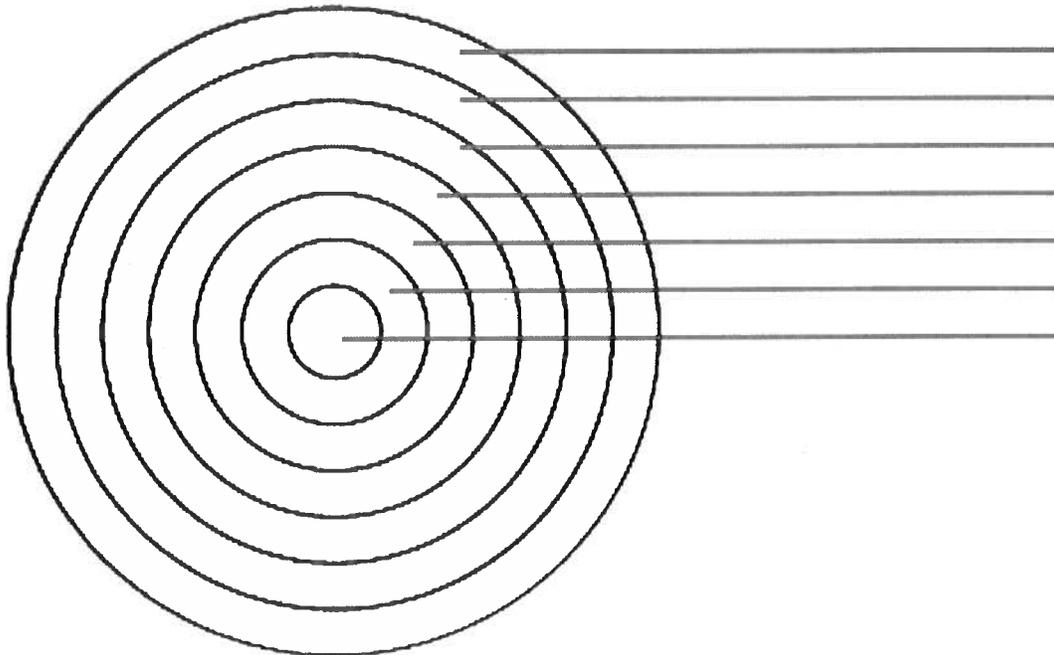
## Classification Today

### **Key Concepts**

- All living things are classified into seven major groups: kingdom, phylum, class, order, family, genus, and species.

### **Explaining Relationships: Understanding the Main Ideas**

Look at the following diagram. If the outermost circle represents a very large group of organisms, or a kingdom, what classification group does each of the smaller circles represent? Put your answers on the lines provided.



Using the diagram and the information you have learned, answer the following questions.

1. Would you find more **different** organisms in a class or a family?

\_\_\_\_\_

2. Which classification group has the largest number of **different** organisms? \_\_\_\_\_
3. Which classification group has only **one** type of organism?  
\_\_\_\_\_
4. The most closely related **different** organisms would probably belong to the same \_\_\_\_\_
5. List the classification groups, in order, from largest to smallest.  
\_\_\_\_\_

## Classification of Mammals by Physical Characteristics

You are investigating ten species of mammals. Your assignment is to decide how closely related these species are to one another so that you can fill in the phylogenetic tree on the back of this page. To do this, you should think about what these animals look like and what you know about where they live, what they eat, etc.

Fill in the blank tree on the back of this page to show how these animals are related.

The ten species of mammals you will use to fill in the phylogenetic tree are:

1. African Savannah Elephant  
(*Loxodonta africana*)



2. Chimpanzee  
(*Pan troglodytes*)



3. Common Shrew  
(*Sorex araneus*)



4. Dog  
(*Canis lupus*)



5. European Hedgehog  
(*Erinaceus europaeus*)



6. Gray, Short-tailed Opossum  
(*Monodelphis domestica*)



7. Horse  
(*Equus caballus*)



8. Mouse  
(*Mus musculus*)



9. Nine-banded Armadillo  
(*Dasyurus novemcinctus*)



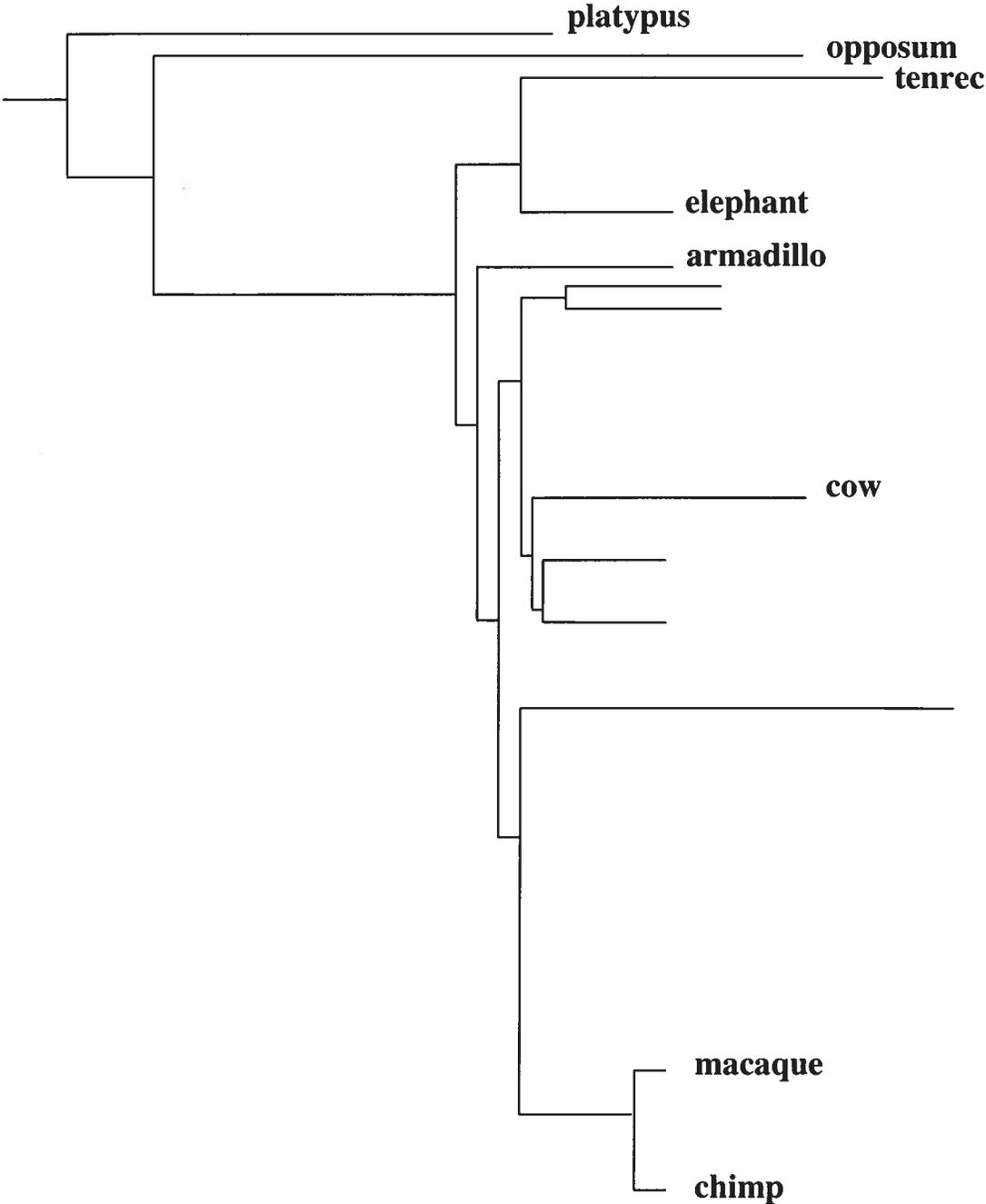
10. Tenrec  
(*Echinops telfairi*)







Using this information, fill in the phylogenetic tree shown below with the 5 organisms still missing from the tree (Dog, Hedgehog, Horse, Mouse, and Shrew). The easiest way to complete the tree is to first decide which organisms are the most closely related to each other (i.e. which organisms have the fewest differences between them). Then decide which organism is most related to cow, and place that organism on the closest line to cow. Then decide which is the next most closely related to cow, and place that organism on the next closest line to cow. Finally, decide which is the least most closely related to cow, and place that organism on the furthest line from cow. Proceed this way until the tree is complete.



Now answer the following questions:

1. Do everyone's trees based on physical characteristics look the same? Why or why not?

2. Do everyone's DNA-based trees look the same? Why or why not?

3. Which method do you think is used to generate current, scientifically accepted phylogenetic trees? Explain your answer.

4. Which animal's placement on the DNA-based tree surprised you the most, and why?



## The Five Kingdoms

### **Key Concepts**

- Today, the most generally accepted classification system contains five kingdoms: monerans, protists, fungi, plants, and animals.

### **Building Vocabulary Skills: Applying Definitions**

In your words, write a definition for each of the following terms.

1. Autotroph \_\_\_\_\_

\_\_\_\_\_

2. Heterotroph \_\_\_\_\_

\_\_\_\_\_

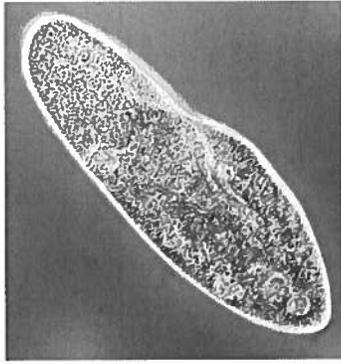
Now apply your understanding of the definitions by labeling each of the following organisms as either an **autotroph** or a **heterotroph**.



1. \_\_\_\_\_



2. \_\_\_\_\_



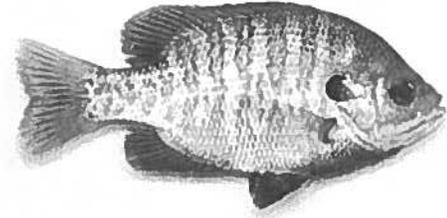
3. \_\_\_\_\_



4. \_\_\_\_\_



5. \_\_\_\_\_



6. \_\_\_\_\_



7. \_\_\_\_\_



8. \_\_\_\_\_



9. \_\_\_\_\_

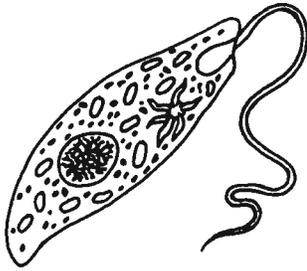
**Reviewing the Five Kingdoms: Understanding the Main Ideas**

Complete the chart by using + to indicate that the description is true and a - to indicate that the description does not apply.

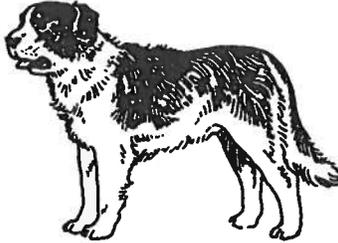
	Unicellular	Multicellular	No Nucleus	Nucleus	Autotroph	Heterotroph
Monera						
Protista						
Fungi						
Plants						
Animals						

### **Applying Knowledge: Using the Main Ideas**

Label each of the organisms with the name of the kingdom to which it belongs.



1. \_\_\_\_\_



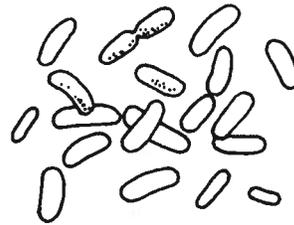
2. \_\_\_\_\_



3. \_\_\_\_\_



4. \_\_\_\_\_



5. \_\_\_\_\_

Compare and contrast the characteristics of one of the following pairs of kingdoms:

- Monera and Protista
- Plants and Fungi
- Plants and Animals

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## Standards Assessment Review

Standard 23: The student will identify and explain how DNA sequencing and physical characteristics are used to classify organisms.

1. Give 5 examples of physical characteristics of a living thing.

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2. Write a physical description of a this animal:



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3. Compare your description to another student's description. They are unlikely to be the same? Why not?

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4. How are physical characteristics used to classify living things?

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5. What is DNA sequencing?

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6. How can you tell from the DNA sequence of two organisms how closely related they are?

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7. Why is DNA sequencing more accurate in classifying organisms than using physical characteristics to do it?

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Standard 24: The student will explain how natural selection is the result of genetic variation, adaptation, competition, and the ability to reproduce.

1. What is genetic variation? Be specific.

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2. What is adaptation? How is this the result of genetic variation? Be specific.

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3. What is competition amongst living things in nature?

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4. Define natural selection.

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5. Natural selection is sometimes referred to as “the survival of the fittest”.  
What does this mean?

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6. Putting it all together: Explain how natural selection is the result of  
genetic variation, adaptation, competition and the ability to reproduce.

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# Biology

## Unit 8: Viruses and Monerans

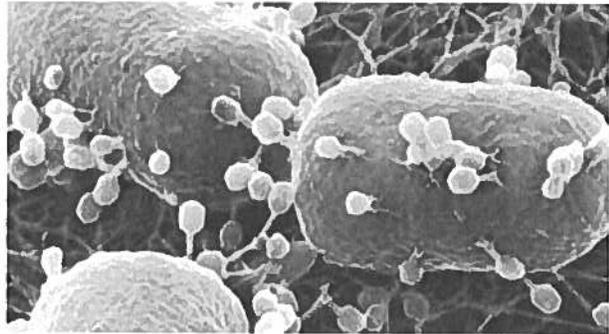
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### Textbook References:

- Biology: Exploring Life: Chapter 16
- Exploring Life Science: Chapter 5

### Projects and Activities:

- ✓ “Understanding Viruses” video
- ✓ Viruses WS
- ✓ Viruses and Bacteria Diagrams
- ✓ “Understanding Bacteria” video
- ✓ Monerans WS
- ✓ Mini Research Project
- ✓ Unit 8 Test



### Study Guide:

#### Vocabulary:

- Virus
- Host
- Parasite
- Decomposer
- Symbiosis
- Antibiotic

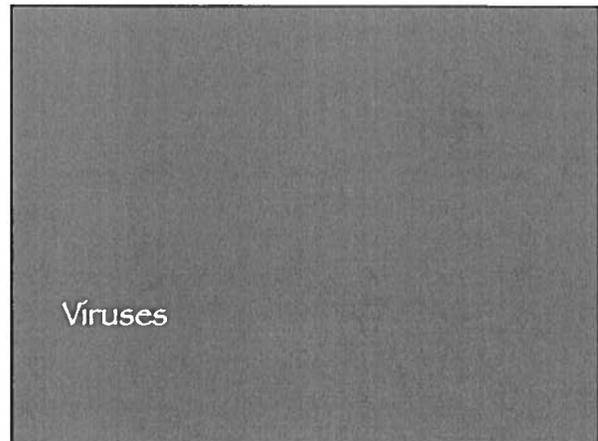
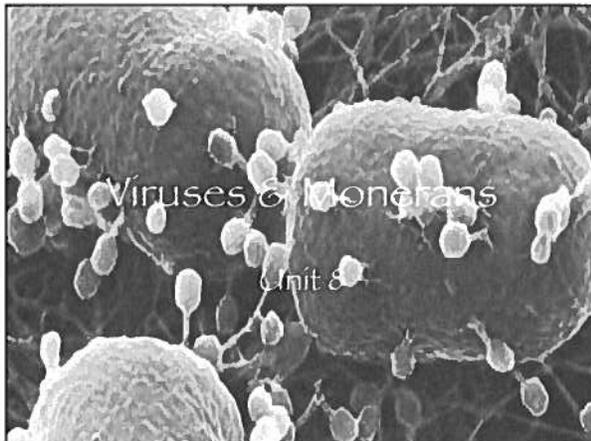
#### Concepts:

- List the parts of a virus.
- Describe how a virus reproduces and causes disease.
- Name and describe the parts of a moneran.
- Compare autotrophic and heterotrophic monerans.
- Discuss the helpful and harmful effects of the monerans.

#### Standards:

27. Describe the reproductive (infection) process of viruses and bacteria.
28. Identify the positive and negative impact of viruses and bacteria on humans.





### What is a Virus?



- A disease causing germ.
- Alive or not???
- Tiny particle that invades cells.
- Not a cell.

A small, dark, textured image of a virus particle, possibly a bacteriophage, showing its head and tail structures.

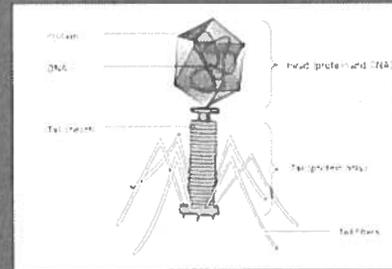
### Virus Facts

- Can't perform functions of life.
  - No need for food; no wastes.
- Can't reproduce on its own.
- All kingdoms affected.
- A virus can only infect a specific type of cell.
- Origin unknown.
  - After 1<sup>st</sup> cells.
  - Left over host DNA?

## Structure of Viruses

- 2 Parts:
  - Tail
    - Tail fibers like “legs”.
    - Attachment of virus.
  - Head
    - Contains hereditary material (DNA or RNA).
    - Controls reproduction.
    - Has protein coat that protects & identifies virus.
- Many shapes.

## Bacteriophage Structure



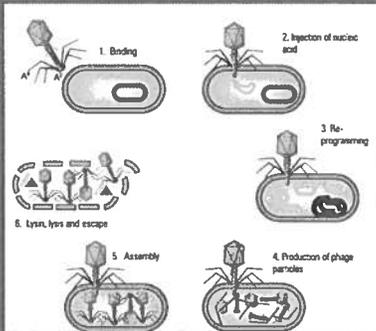
## Reproduction of Viruses

- Can't reproduce on its own.
- Needs a host.
  - Other living cell.
- Is a parasite.
  - Survives by living on, in or near a host and harming it.

## Bacteriophage Reproduction

- A bacteriophage is a virus that infects bacteria.
- Attaches to cell membrane.
- Injects hereditary material into bacteria.
- Bacteria reproduces using viral DNA, too.
- Bacteria becomes full of viruses and bursts.
- New viruses go out and infect more bacteria.

## Bacteriophage Reproduction



## What is a Vaccine?

- Preventive.
- Virus is killed or weakened.
- Injected into person.
- Person's immune system learns to recognize the intruder and builds a defense system (immunity).

## Beneficial Uses

- Used to kill harmful bacteria.
- Used to kill harmful insects, etc.
- "Germ warfare"?

## Genetic Engineering

- Viruses have been used to "plant" new DNA into a defective cell.
- Cures genetic disorders.
- Makes crops insect resistant, for example.

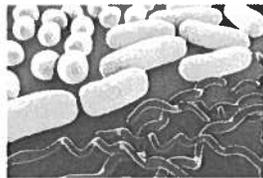
## Monerans

## Characteristics

- Are commonly called bacteria.
- First appeared 3.5 billion years ago.
- Simplest living organisms.
- Very numerous.
  - 1 g of soil may have 2.5 million bacteria.
- Found everywhere.
  - Some are “extremophiles”.
    - Live in extreme conditions (volcanoes).

## What do bacteria look like?

- 3 basic shapes.
  - Rod, sphere, spiral
- Many colors.
- May live in a colony or singly.



## Bacteria Structure

- Cell wall
- Cell membrane and cytoplasm
- DNA not in a nucleus
- Movement
  - On own with flagella
  - Wind, water, etc.



### Life Functions of Bacteria

- Some are aerobic, some anaerobic.
- Some heterotrophs, some autotrophs.
- Some are decomposers.
  - Feeds on dead organisms – returning nutrients to the soil for re-use.
- In good conditions, reproduce quickly.
- In bad conditions, “wait it out”.
  - Have a capsule or endospore that enclosed and protects it.
  - Makes it difficult to kill.

### Bacteria in Nature

- Most do not cause disease.
- Instead have a beneficial role to play.

### Food and Energy Relationship

- Decomposers break down dead things to obtain energy.
- In the process, those dead things are recycled into simpler substances.
- Autotrophs use these to build their cells.
- Heterotrophs eat autotrophs, etc.....

### Oxygen Production

- Cyanobacteria release oxygen while making food.
- Helped to change Earth's early atmosphere.



### Changing Environments

- Can live on a rock and change it to soil then other organisms can live there.
- Cleaning up dead organisms.

### Symbiosis

- Symbiosis is a relationship between two organisms in which at least one of them benefits and neither is harmed.
- Nitrogen-fixing bacteria
  - These bacteria are found in the soil where certain types of plants grow (alfalfa).
  - Take nitrogen from the air and make it into a form plants can use from the soil.

### Bacteria & Humans

### Food

- Uses
  - Production of food (cheese, yogurt, pickles).
  - N-fixing for crop plants.
  - Food for other organisms.
- Cause food spoilage.
  - Prevent it by creating situations bacteria can't survive in.
  - Cold, salty, dry, hot, smoky, pasteurized

### Fuel

- Used to make fuel (methane or natural gas).
- Can cause the breakdown of organic material to become petroleum.

### Environmental Clean-up

- Treat sewage.
- Rot garbage.
- Clean up oil spills.
- Break down pesticides.

### Health & Medicine

- Keep us healthy.
  - Found in the digestive tract to help digest certain foods.
  - Cows and termites have a bacteria living in their digestive tract to help them break down cellulose (plant fiber).

### Health & Medicine

- Can cause disease.
  - Use antibiotics to kill bacteria.
  - An antibiotic is a chemical that is used to kill bacteria.
  - Antibiotics work on bacteria ONLY!

## Industry

- Used in tanning leather.
- Takes valuable minerals out of rock.
- Many uses in food industry.
- Can cause breakdown of equipment, structures, etc.

Biology  
Unit 8: Viruses & Monerans  
Mrs. Eytcheson

Name \_\_\_\_\_

Due Date: \_\_\_\_\_

## Viruses

### ***Key Concept***

- First, a virus gets its hereditary material into the host cell. Then the host cell makes more virus particles. Finally, the virus particles leave the original host cell and infect new hosts.

### **Building Vocabulary Skills: Identifying Facts**

In the spaces provided, extend your knowledge about the vocabulary words listed by writing two short complete sentences about each word.

1. Virus \_\_\_\_\_

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2. Parasite \_\_\_\_\_

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3. Host \_\_\_\_\_

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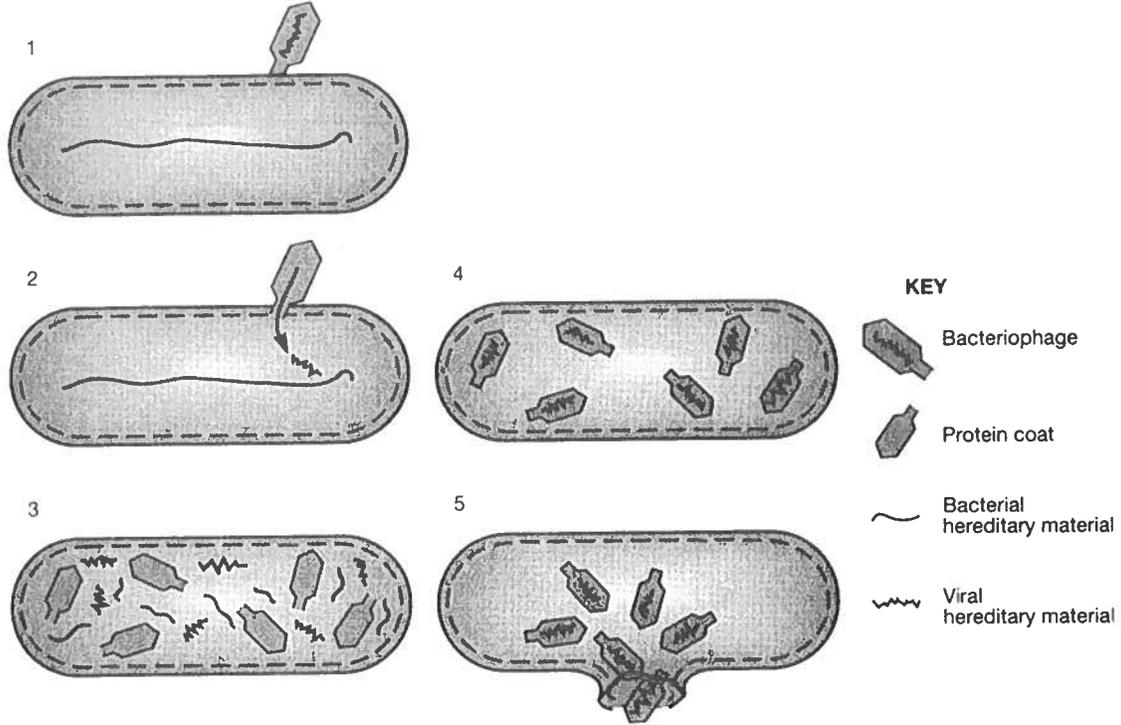
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4. Bacteriophage \_\_\_\_\_

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## Interpreting Diagrams: Using the Main Ideas

Study the illustration below. In the space provided, explain what happens in each numbered step.



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### **Making a List: Understanding the Main Ideas**

In any virus "life cycle", there are three basic steps. Summarize the steps in the spaces provided.

1. 

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2. 

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3. 

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In the space provided, write a short paragraph telling what you have learned about the interaction between viruses and human hosts. Concentrate on information you found to be interesting.

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## Viruses & Bacteria

Identify each diagram and label the parts.

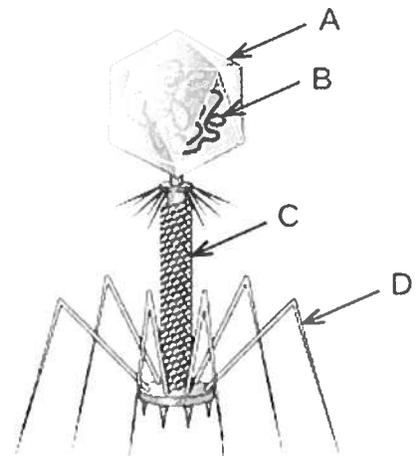
1. This is a diagram of a \_\_\_\_\_.

A. \_\_\_\_\_

B. \_\_\_\_\_

C. \_\_\_\_\_

D. \_\_\_\_\_



2. This is a diagram of a \_\_\_\_\_.

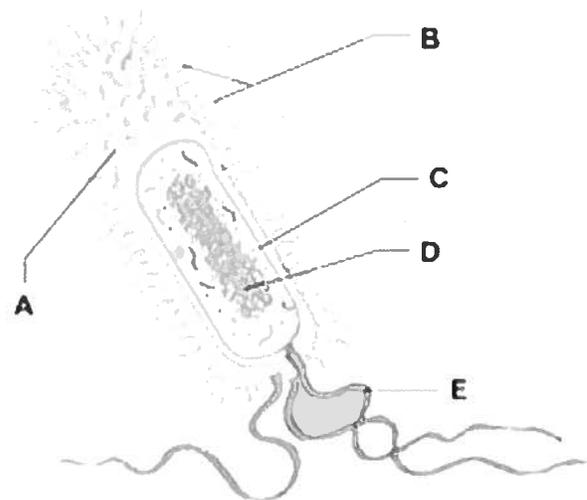
A. \_\_\_\_\_

B. \_\_\_\_\_

C. \_\_\_\_\_

D. \_\_\_\_\_

E. \_\_\_\_\_





Biology  
Unit 8: Viruses & Monerans  
Mrs. Eytcheson

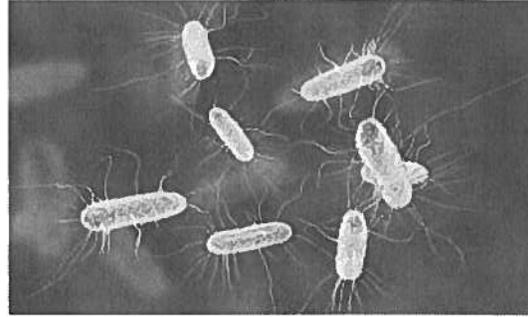
Name \_\_\_\_\_

Due Date:

## Monerans

### Key Concept

- Bacteria are an essential part of the food and energy relationships that link all life on Earth.



### Building Vocabulary Skills: Fill in the Facts

Supply the missing information to complete the chart.

Simplest organisms that consist of a single cell	
Trait that makes monerans different from other cells	
	Common name for monerans
	When bacteria first appeared on Earth
Number of bacteria in a gram of soil	
3 basic shapes of bacteria	
Bacteria that feed on dead organisms	
Symbiosis	
Bacteria living within cows and termites	
	Chemicals that weaken or destroy bacteria

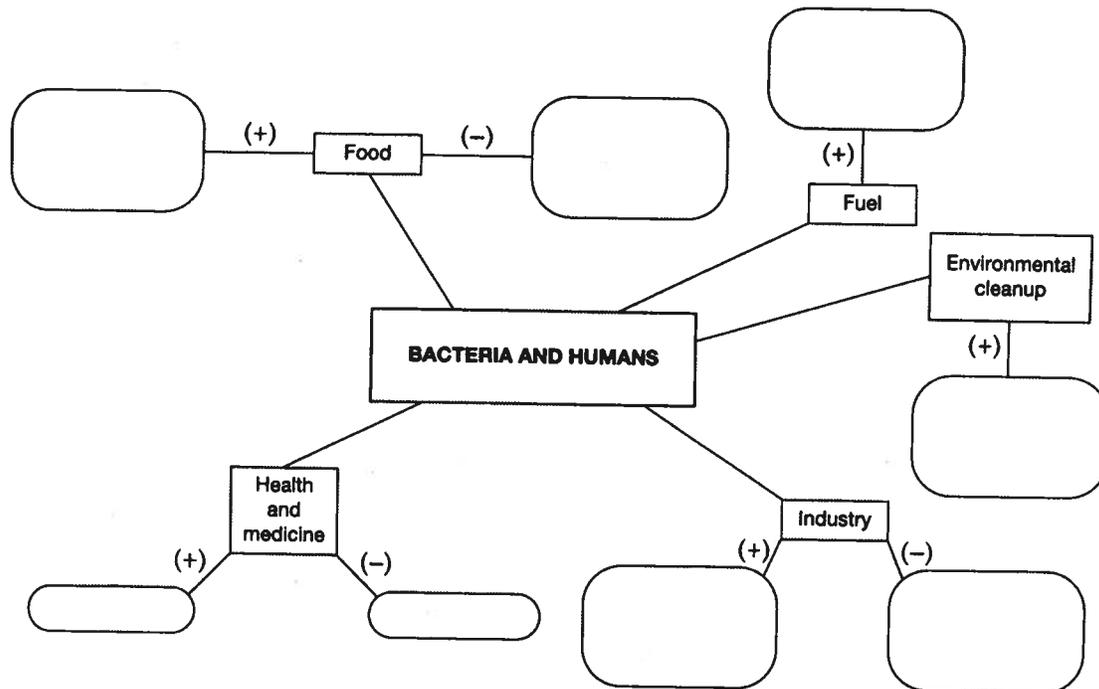
### Connecting the Links: Using the Main Ideas

Complete the chart with an appropriate example of each type of bacterial activity.

Activity of Bacteria	Example
Food and energy relationships	
Oxygen production	
Changing environments	
Symbiosis	

### Links Between Bacteria and Humans: Understanding the Main Ideas

Complete the following concept map. The (+) indicates a positive link whereas the (-) indicates a negative link.



Biology

Name \_\_\_\_\_

Unit 8: Viruses & Monerans

Mrs. Eytcheson

## Standards Assessment Review

### Unit 8 Review

Standard 27: I am able to describe the reproductive (infection) process of viruses and bacteria.

1. Briefly describe how viruses reproduce.

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2. Briefly describe how bacteria reproduce.

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Standard 28: I am able to identify the positive and negative impact of viruses and bacteria on humans.

3. Give two examples of how viruses can negatively impact us.

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4. Give two examples of how viruses can positively impact us.

---

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5. Give two examples of how bacteria can negatively impact us.

---

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6. Give two examples of how bacteria can positively impact us.

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# **Biology**

## **Unit 9: Exploring Human Structure and Function**

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Textbook Reference: Chapters 15-21, pages 391 – 551

### Projects and Activities

- Human Body Corporation WebQuest
- The Human Body WS
- The Skeletal System WS
- The Muscular System WS
- The Importance of Food WS
- Digestion of Food WS
- Absorption of Food WS
- Maintaining Good Health WS
- The Body's Transportation System WS
- Circulation in the Body WS
- Blood – The River of Life WS
- Cardiovascular Diseases WS
- The Respiratory System WS
- The Excretory System WS
- The Nervous System WS
- Divisions of the Nervous System WS
- The Senses WS
- The Endocrine System WS
- The Reproductive System WS
- The Stages of Development WS
- Body Defenses WS
- Immunity WS
- Diseases WS

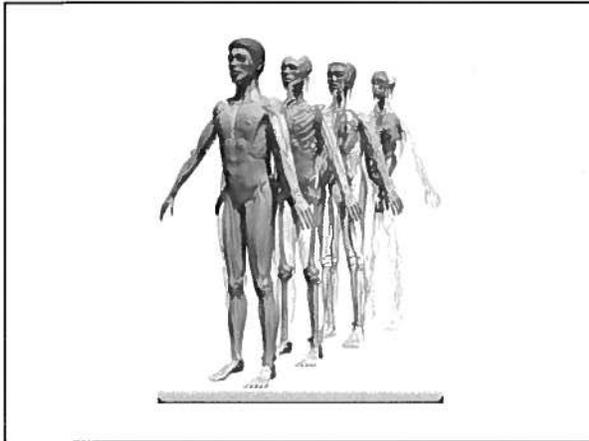
### Concepts:

- Relate anatomy and physiology.
- Identify the levels of structure in the human body.
- Describe how the integumentary system contributes to homeostasis.
- Describe how the skeletal system contributes to homeostasis.
- Describe how the muscular system contributes to homeostasis.
- Describe how the nervous system contributes to homeostasis.
- Describe how the digestive system contributes to homeostasis.
- Describe how the circulatory system contributes to homeostasis.
- Describe how the lymphatic system contributes to homeostasis.

- Describe how the respiratory system contributes to homeostasis.
- Describe how the urinary system contributes to homeostasis.
- Describe how the endocrine system contributes to homeostasis.
- Describe how the reproductive system contributes to homeostasis.

Standards Assessment:

25. Students will identify the 11 vertebrate systems and their functions.
26. Students will understand and describe the important relationships between body systems in controlling body functions.

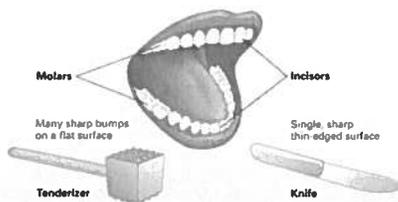


## Exploring Human Structure and Function

Unit 9

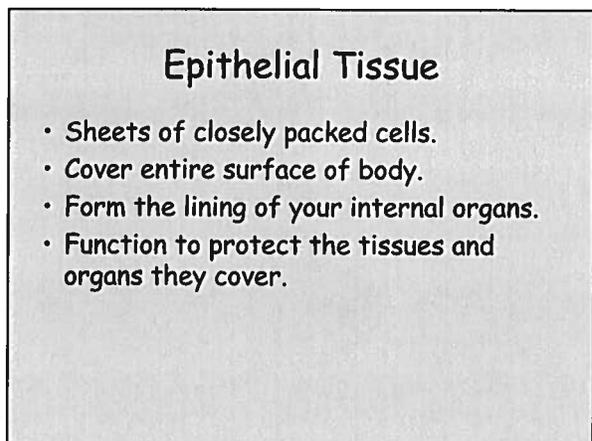
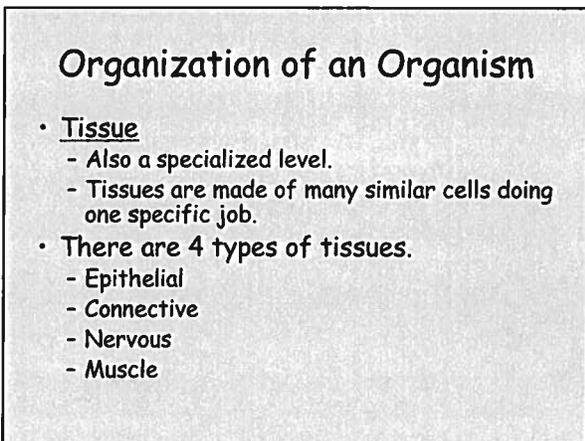
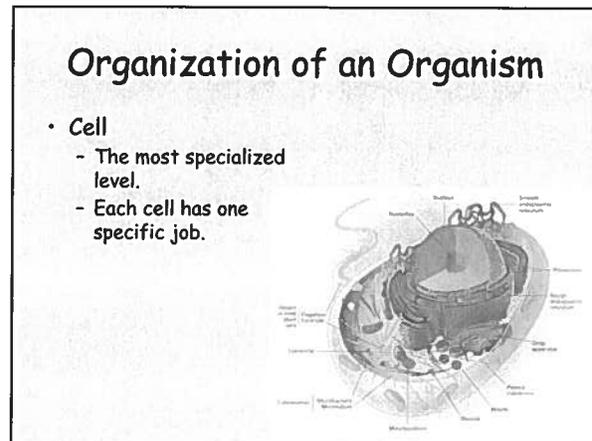
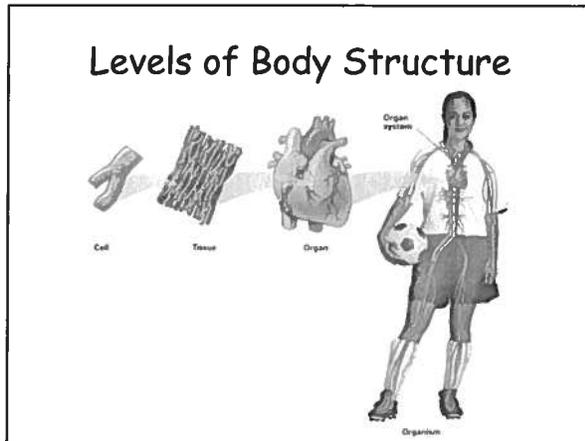
### Structure Fits Function in the Human Body

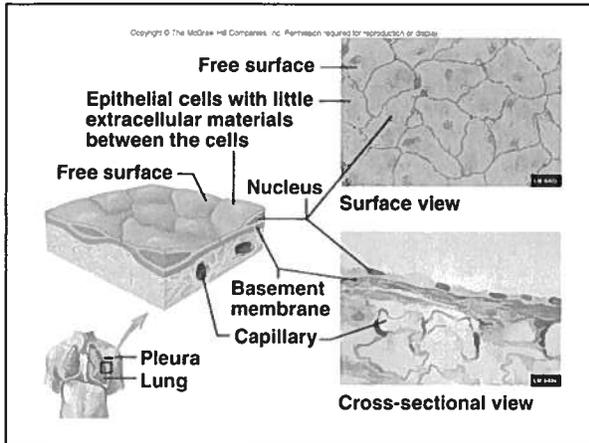
- Look at a structure...it gives you clues as to its function.



### Anatomy & Physiology

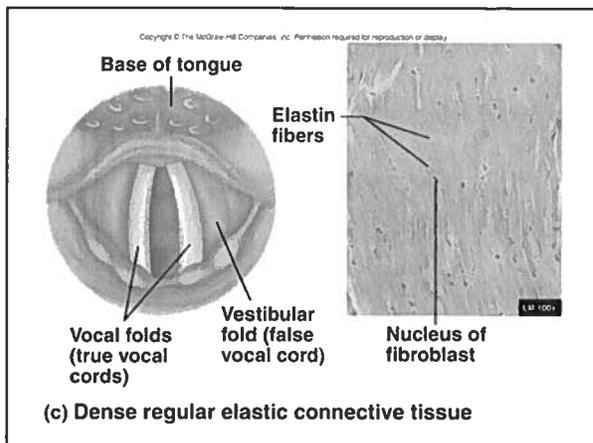
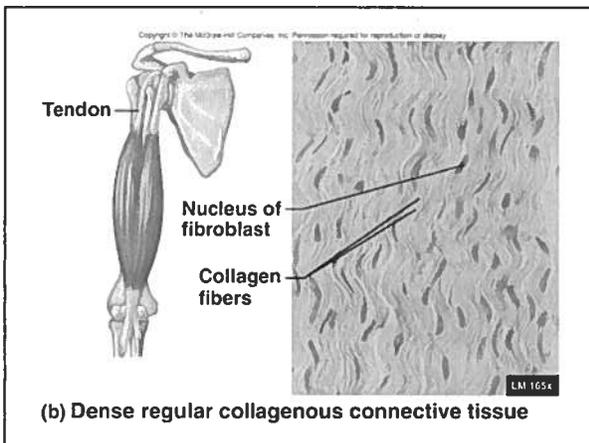
- The study of the structure of an organism and its parts is called anatomy.
- Physiology is the study of a structure's function.

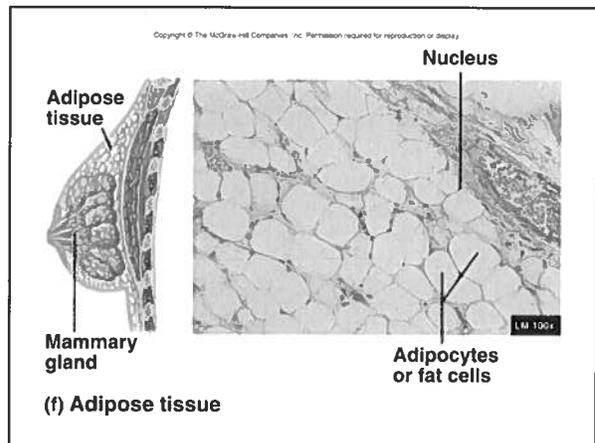
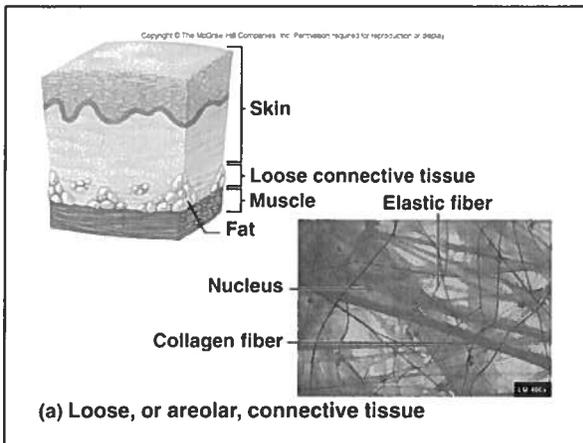
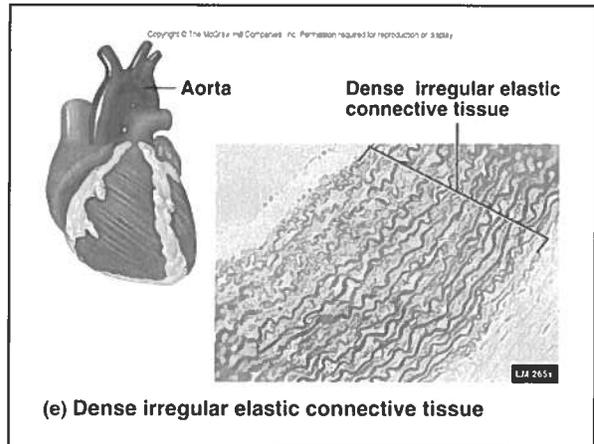
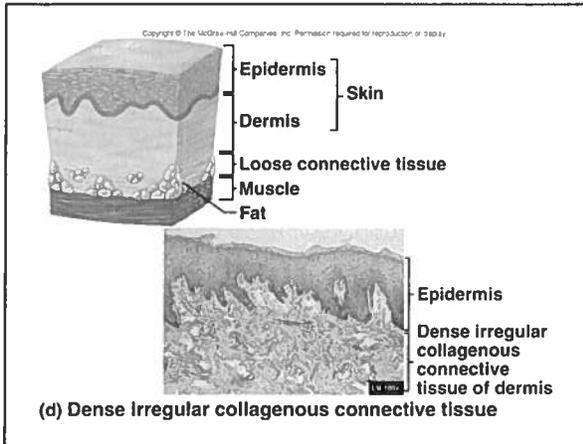


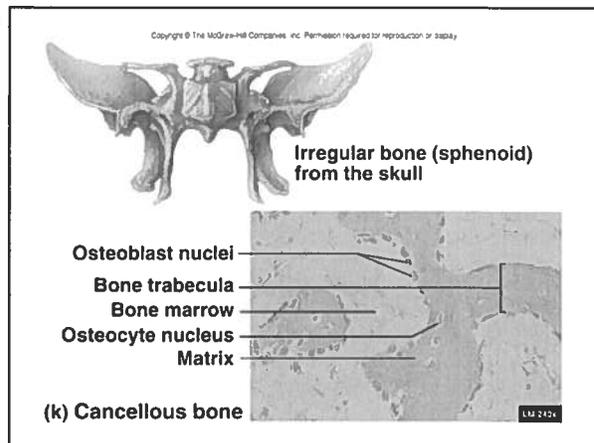
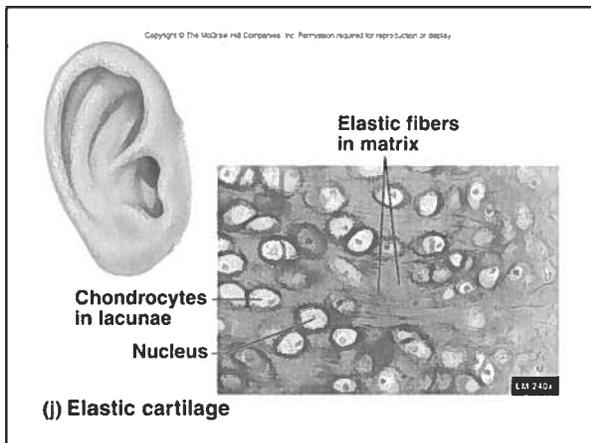
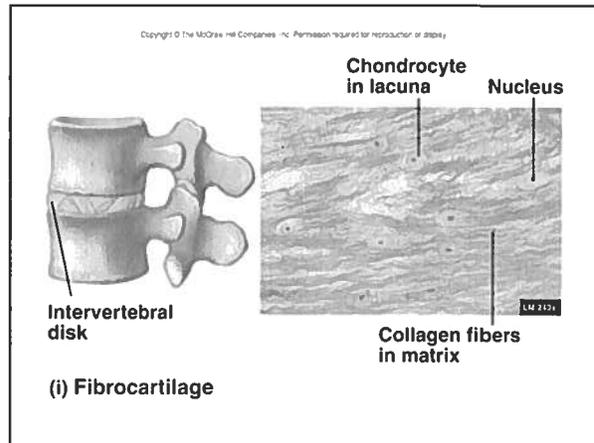
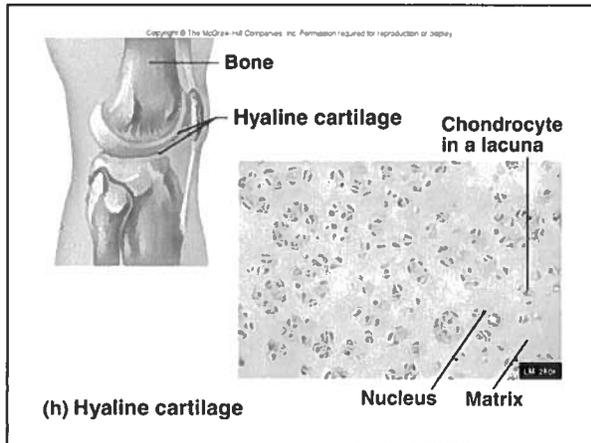


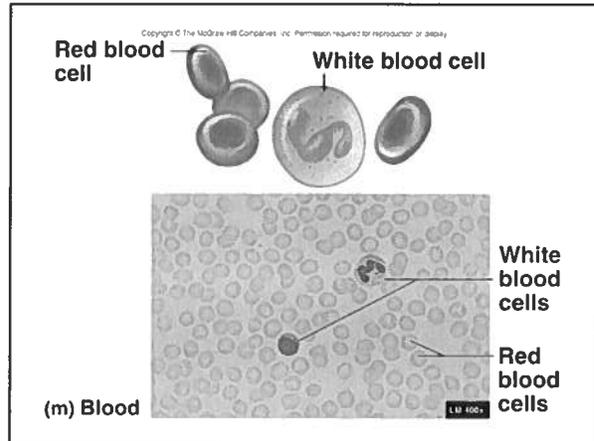
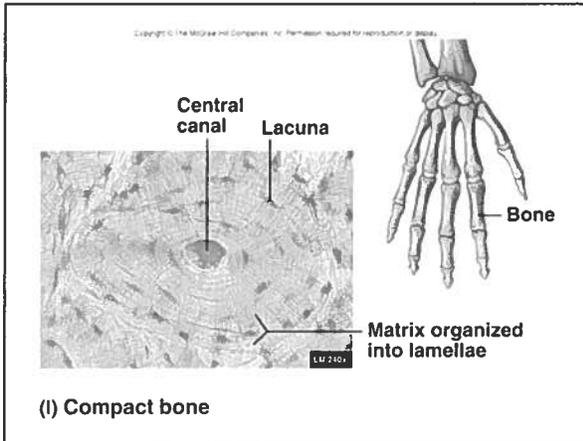
## Connective Tissue

- Main function is to hold together and support other tissues.
- Cushions, insulates, and connects organs.
- Cells are scattered in a “matrix” of fibers that acts like glue.



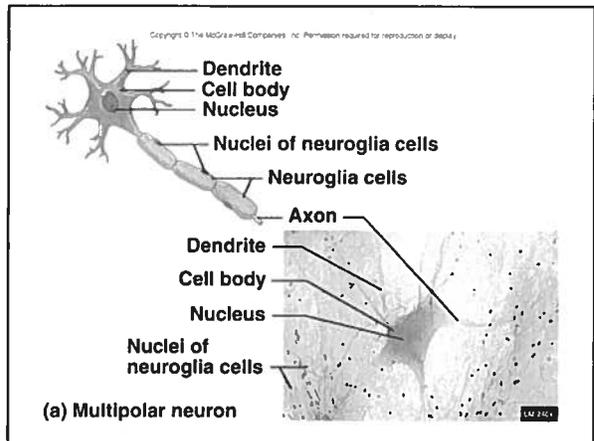






## Nervous Tissue

- Forms the communication system that connects brain to the rest of the body.
- Allows you to respond to changes in the environment - both internal and external.
- The neuron is the basic cell type found in this tissue.
- Neurons transmit signals rapidly over long distances.

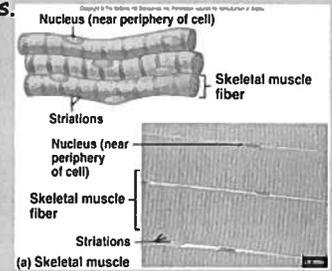


## Muscle Tissue

- Muscles are organs that enable us to move, move our blood, and push food through the digestive system.
- 3 types:
  - Skeletal
  - Cardiac
  - Smooth

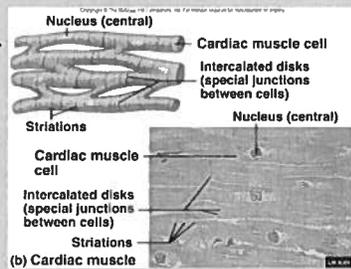
## Skeletal Muscle

- A voluntary muscle.
- Attaches to bones.



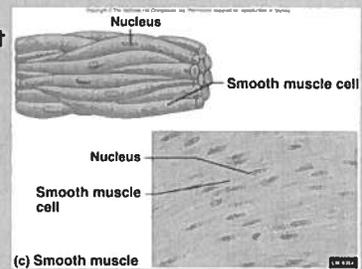
## Cardiac Muscle

- An involuntary muscle.
- Heart muscle.



## Smooth Muscle

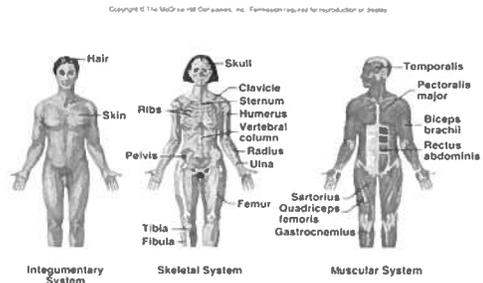
- An involuntary muscle.
- Found in most organs.



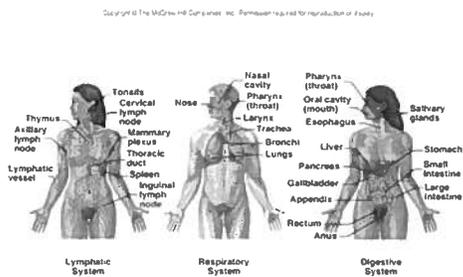
## Organization of an Organism

- Organ
  - Organs are made up of several tissues working together to perform a specific job.
- Organ System
  - Consists of multiple organs working together to perform a vital body function.

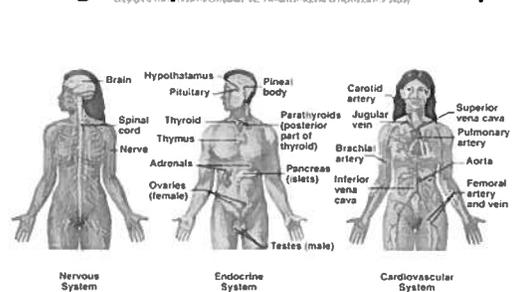
## Organ Systems of the Body

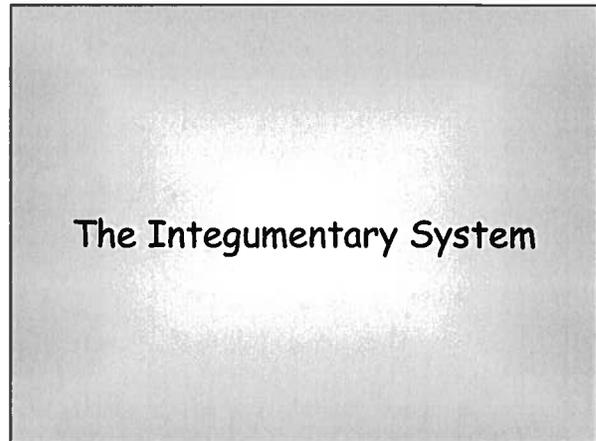
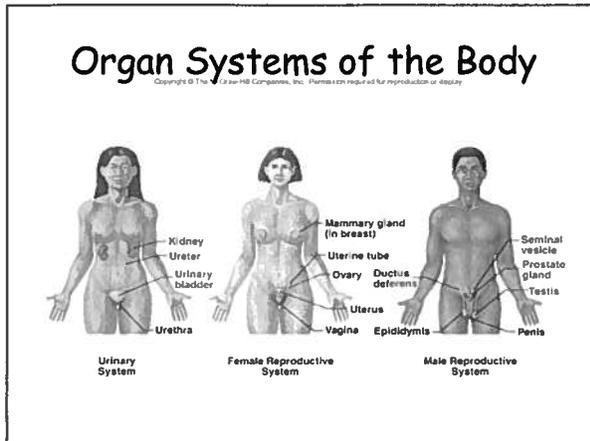


## Organ Systems of the Body



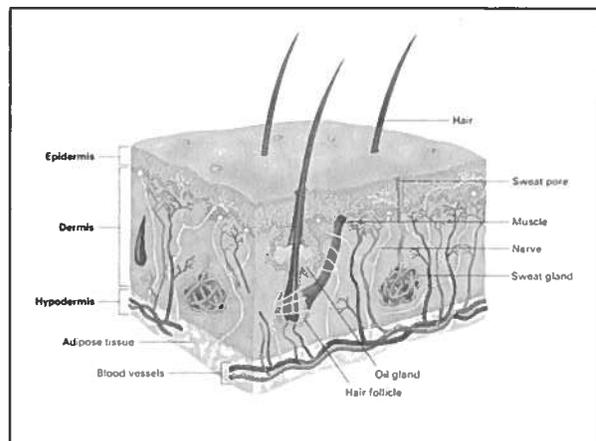
## Organ Systems of the Body





### Anatomy of Integument

- Aka skin (2 mm thick)
- Physically separates the body from the environment.
- The epidermis is the top layer made up of mostly dead epithelial cells.
  - Impermeable
- The dermis is the cell layer under the epidermis made up of connective tissue.
  - Strong & elastic



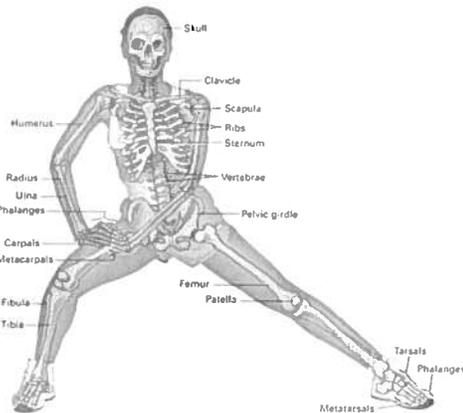
### Physiology of Integument

- Provides physical barrier against dirt and microorganisms.
- Insulation
- Cushion
- Sweat to cool body down.
- Hair protects scalp.
- Eyebrows and eyelashes protect eyes from dirt getting into eyes.

### The Skeletal System

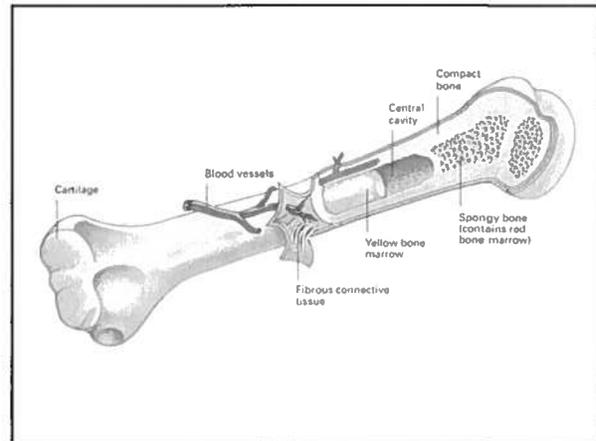
### Anatomy of the Skeleton

- Made up of bones and cartilage.
- Approx. 206 bones in adult skeleton.



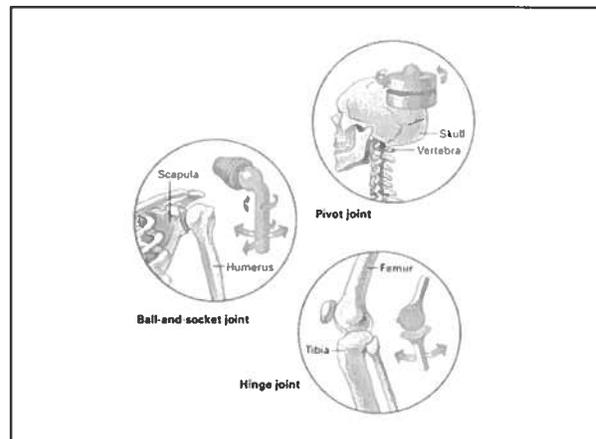
## Bone Structure

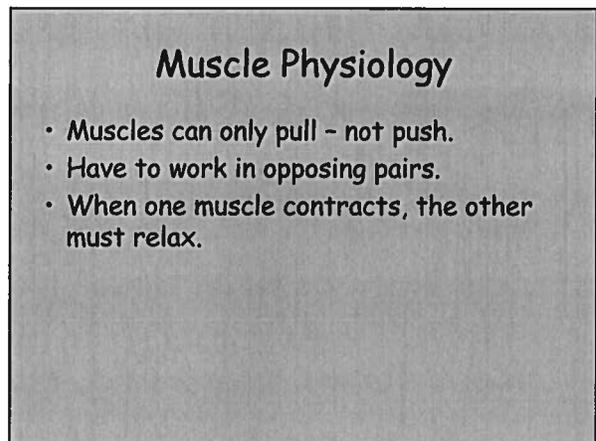
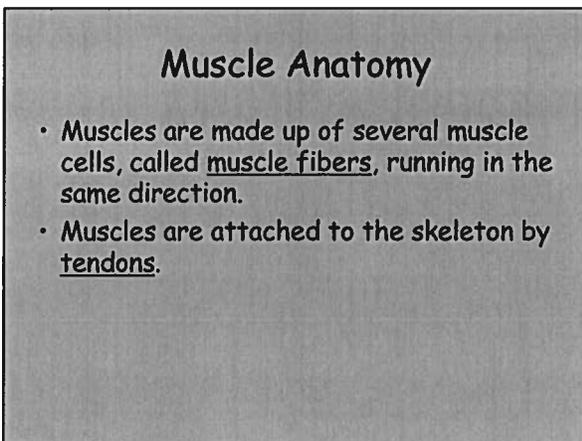
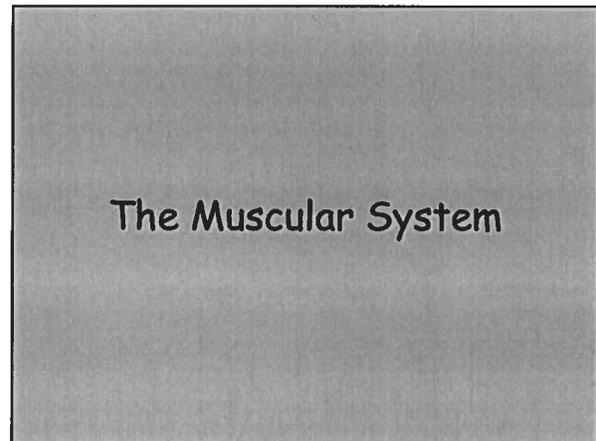
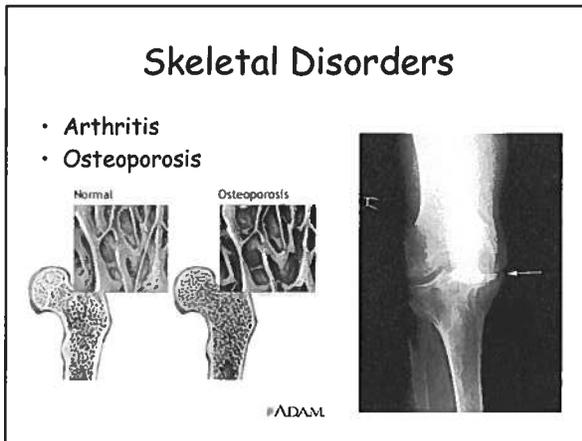
- Bone cells are surrounded by a material called bone matrix.
- Flexible fibers are made of protein.
  - Allows bone to flex a little.
- Hard minerals are phosphate and calcium.
  - Allows bone to withstand force.
- Contains marrow, a special tissue that stores fat or makes new blood cells.

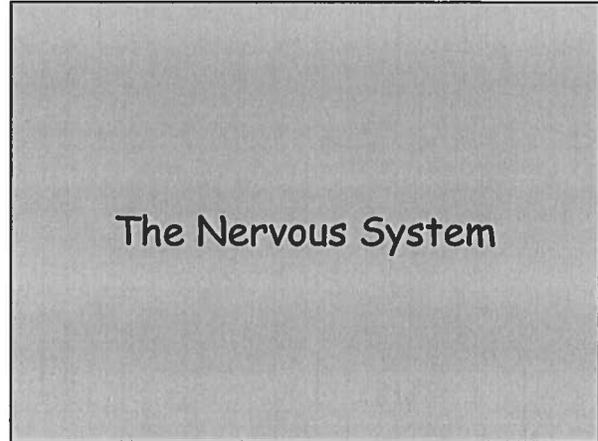
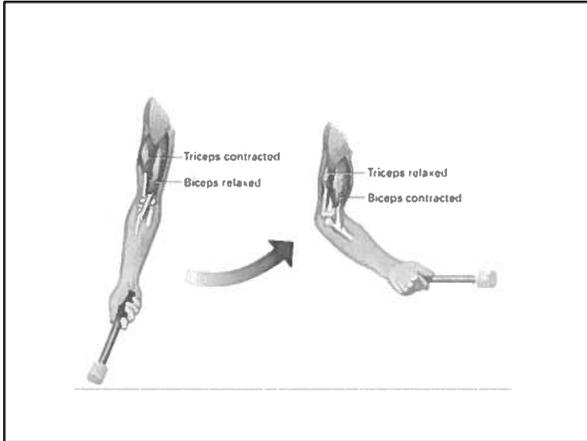


## Articulations

- Better known as the joints where your skeleton bends.
- A joint is a place where one bone connects and moves against another bone.
- There are many types of joints in your body.
- Bones involved in a joint are held together by a ligament.

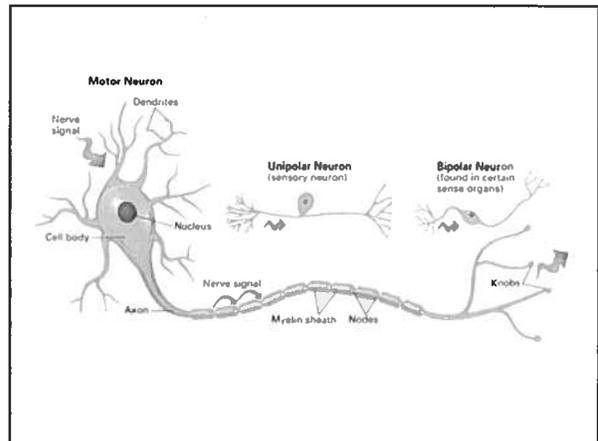






### Nervous System Anatomy

- Neurons make up the nerves which make up your nervous system.
  - Cell body
  - Dendrite
  - Axon
    - Electrical signals travel through these carrying the impulse.
- Neurons are connected to each other by a space called the synapse.
  - The signal is carried across the synapse by the release of chemicals that travel across the gap.

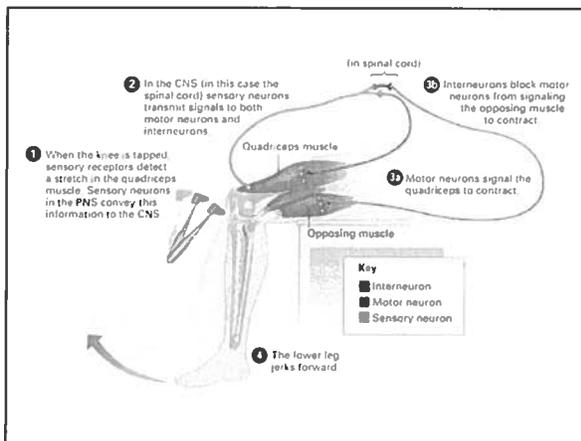


## Impulse Path

- Stimulus → Sensory receptor → sensory neuron → interneurons → motor neuron → effector → reflex
- A **stimulus** is something that causes a reaction.
- **Sensory receptors** are special cells that receive info from the environment.
- **Sensory neurons** receive the message from the receptor and send it to the brain and spinal cord.

## Nerve Pathway Continued

- **Interneurons** found in the spinal cord and brain connect sensory neurons to motor neurons.
- **Motor neurons** transmit the signal from the brain and spinal cord to muscle cells or glands in the body.
- The muscle cell or gland stimulated is the **effector**.
- What the stimulation message is determines the reflex.



## Divisions of the NS

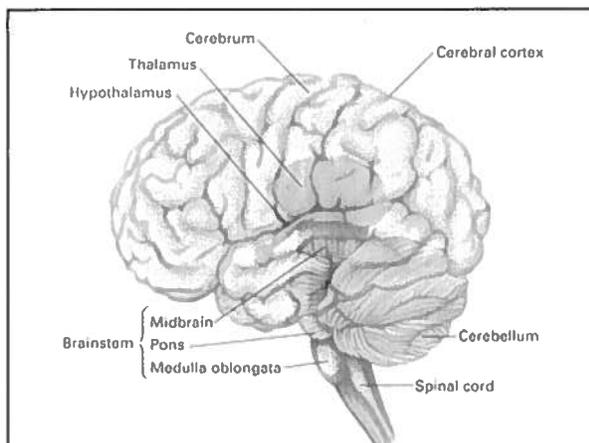
- **Central Nervous System**
  - Contains brain and spinal cord.
  - Control center of the body.
- **Peripheral Nervous System**
  - Consists of a network of nerves that branch out from the CNS and connect it to the organs of the body.

## The CNS

- **Overview**
  - Interprets info that comes in from all over body.
  - Issues commands to those same parts of the body.
  - The brain is the main control center, transmitting and receiving messages thru the spinal cord.
  - The spinal cord provides the link between body and brain.

## The Brain

- Billions of neurons.
- 1.4 kg
- Divided into 3 main parts:
  - The cerebrum
  - The cerebellum
  - The medulla



## The Cerebrum

- Largest part.
- Learning, intelligence, judgment occur here.
- Controls voluntary movement.
- Shapes attitudes, emotions, personality.
- Divided into left and right halves.
  - Left
    - Mathematical ability
    - Sensations on right side of body.
  - Right
    - Artistic ability
    - Sensations on left side of body.

### The Cerebellum

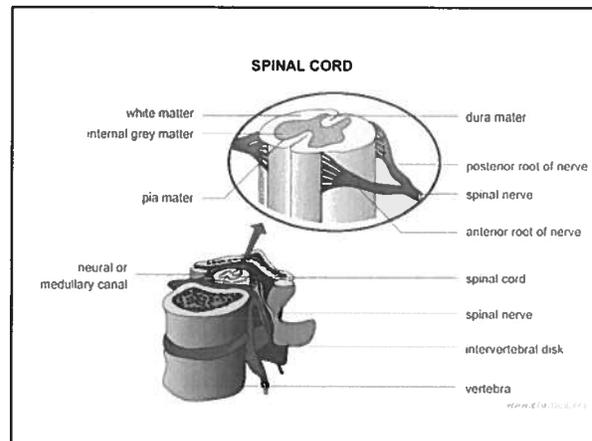
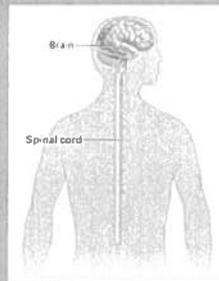
- 2<sup>nd</sup> largest part.
- Coordinates actions of muscles.
- Controls balance.
- Allows body to move smoothly and skillfully.

### The Medulla

- Aka the brainstem.
- Connects brain to spinal cord.
- Controls involuntary actions
  - Heartbeat
  - Breathing
  - Blood pressure

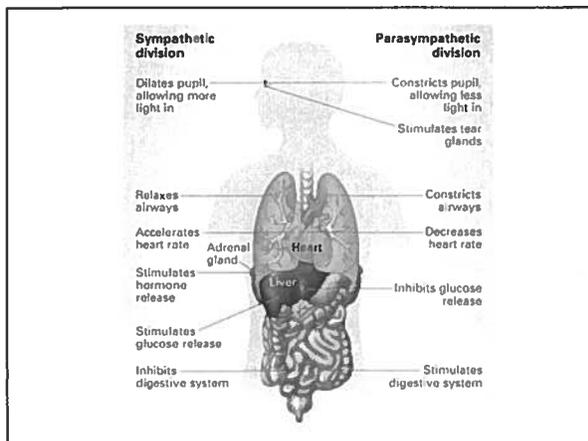
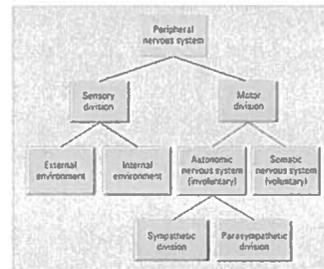
### The Spinal Cord

- Runs entire length of neck and back.
- Connects brain to all the nerves in the body.
- 31 pairs of nerves enter/exit the spinal cord.



## The PNS

- **Overview**
  - Link between CNS and rest of body.
  - 43 pairs of nerves.
  - Some can be consciously controlled.
  - Some are under involuntary control.
    - This is known as the autonomic nervous system.



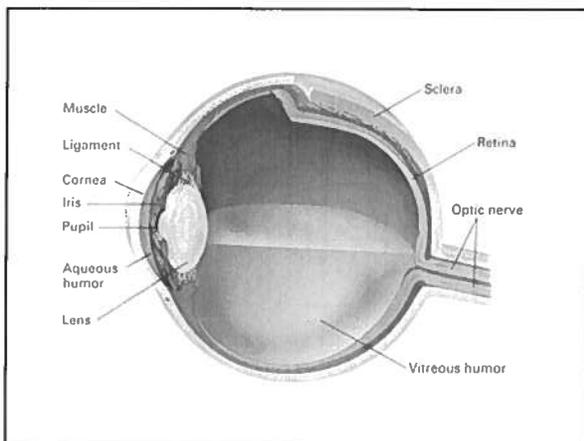
## The Senses

## Sense Organs

- Overview
  - Respond to light, sound, heat, pressure, and chemicals and also detect changes in the position of the body.
  - Gather info from external and internal environment.

## Vision

- Organ of vision is the eye.
- Designed to focus light rays to produce images of objects.

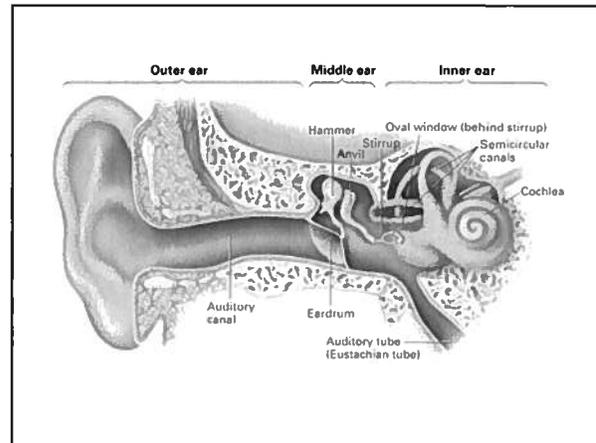


## Parts of the Eye

- **Cornea:** part of the eye's outer layer where light enters.
- **Iris:** colored part of eye.
- **Pupil:** opening in middle of iris that light enters the eye through.
- **Lens:** focuses light coming into eye.
- **Retina:** back surface of eye where light sensitive receptor cells are found.
  - Rods and cones

## Hearing and Balance

- The ear is the organ of hearing and balance.
- Designed to capture and transmit sound waves.

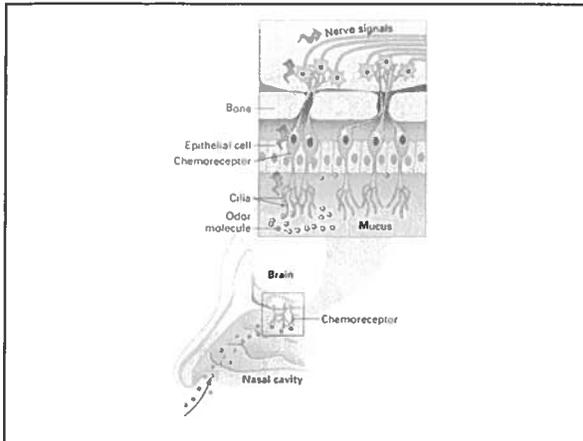


## Parts of the Ear

- **Eardrum:** tightly stretched membrane that separates the ear canal from the middle ear.
- **Cochlea:** Contains nerves that are stimulated by the waves of vibrations.
- **Semicircular canals:** responsible for balance; tiny hairs move as fluid adjusts to body position sending impulses to brain.

## Smell and Taste

- Organs of smell and taste respond to chemical stimuli instead of physical stimuli.
- The same chemicals stimulate taste and smell.
  - May be reason food is not flavorful when you have a stuffed up nose.



## Touch

- The skin is the sense organ for touch.
- In the skin are many sensory receptors.
- Touch, pressure, heat, cold, pain.
- Needed in order to recognize potential danger.

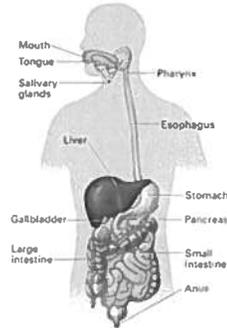
## The Digestive System

### Digestion Overview

- Entire tube is approximately 9 meters long.
- Entire tube is lined with epithelial cells that secrete a mucous.
  - Provides lubrication.
  - Prevents self-digestion
    - Digestive juices are so acidic they can dissolve an iron nail
    - Stomach cells are replaced every 3 days.

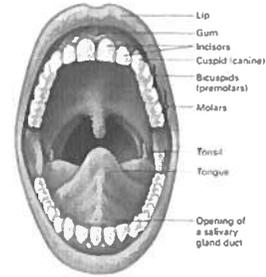
## Organs of the Digestive System

- Mouth
- Pharynx
- Esophagus
- Stomach
- Small intestine
- Large intestine
- Also includes:
  - Salivary glands
  - Pancreas
  - Liver
  - Gallbladder



## Mouth

- Mechanical digestion
  - Teeth and tongue
- Chemical digestion
  - Saliva contains enzymes that break food down, kill bacteria, neutralize acids, protect teeth from decay.

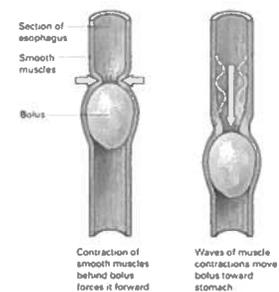


## Pharynx

- The tongue pushes a chewed clump of food (bolus) down into the throat.
- Upper portion of throat.
- Junction of digestive system with respiratory system.
- The epiglottis seals the airway when you swallow.

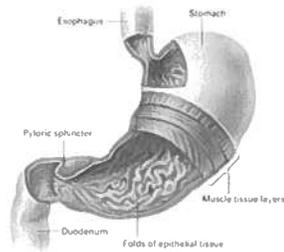
## Esophagus

- The bolus enters the esophagus next.
- A long, muscled tube.
- Connects pharynx to stomach.
- Food is pushed thru by peristalsis, the wave-like muscle contractions that start at the top and work their way down.



## Stomach

- The stomach is a stretchy muscular sac that holds food.
- Mechanical and chemical digestion occur here.
- When mixed with the digestive juices the bolus becomes chyme.



## Small Intestine

- 6 meters long.
- Digestion is finished.
- Absorption of food nutrients takes place.

## Liver

- Largest internal organ.
- Produces the digestive enzyme bile.
  - Used in the break down of fats.
- Delivers the bile to the small intestine.

## Gallbladder

- Bile from the liver is temporarily stored in the gallbladder until needed.

### Pancreas

- Produces and secretes insulin into the blood stream to control blood sugar level.
- Produces and secretes digestive enzymes into the small intestine.
  - Neutralizes the stomach's acids.

### Large Intestine

- Aka colon.
- 1.5 meters long.
- Major function is reabsorb water from the unusable materials left over from digestion.

### The Lymphatic System

- Organs are:
  - Lymphatic vessels and lymph nodes.
- Function is:
  - Removes foreign substances from the blood and lymph, combats disease, maintains tissue fluid balance, absorbs fats from digestive tract.

### Respiratory System

- Organs are:
  - Lungs and respiratory passages
- Function is:
  - Exchanges oxygen and carbon dioxide between blood and air and regulates blood pH.

## Endocrine System

- **Organs are:**
  - Glands, like the pituitary gland and thyroid gland, that secrete hormones.
- **Function is:**
  - A major regulatory system that influences metabolism, growth, reproduction, and many other functions.

## Cardiovascular System

- **Aka:** the circulatory system
- **Organs are:**
  - Heart, blood vessels, and blood.
- **Function is:**
  - Transports nutrients, waste products, gases, and hormones throughout the body; plays a role in the immune response and the regulation of body temperature.

## Urinary System

- **Organs are:**
  - Kidneys, urinary bladder, and vessels that carry urine.
- **Function is:**
  - Removes waste products from the blood and regulates blood pH, ion balance, and water balance.

## Reproductive System

- **Organs are:**
  - Ovaries, uterus, mammary glands, testes
- **Function is:**
  - Involved in the production of offspring.

### **Integumentary System**

- **Organs are:** skin, hair, nails, and sweat glands
- **Function is:** protects us from injury and infection; regulates temperature, prevents water loss, and involved in producing vitamin D

### **Skeletal System**

- **Organs are:** bones, cartilage, joints
- **Function is:** protects, supports and allows body movement produces blood cells and stores minerals

### **Muscular System**

- **Organs are:** muscles attached to skeleton, like the biceps brachii.
- **Function is:** produces body movement, maintains posture, and produces body heat

### **Nervous System**

- **Organs are:** brain, spinal cord, nerves and sensory receptors
- **Function is:** major regulatory system; detects sensation, controls movement, controls physiological and intellectual functions

## Digestive System

- **Organs are:** Mouth, esophagus, stomach, intestines, liver, pancreas, gall bladder
- **Function is:** performs the mechanical and chemical processes of digestion, absorption of nutrients, and elimination of wastes