



Welcome to Mrs. Peterson's
Science Class Connect



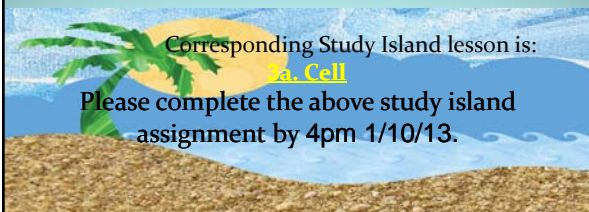
1/2/13



**This week's topic is on:
Cells & Organism Structure
Introduction**

Ohio Academic Content Standards

- Explain that multi-cellular organisms have a variety of specialized cells, tissues, organs and organ systems that perform specialized functions.
- Identify how plant cells differ from animal cells (e.g., cell wall and chloroplasts).



Corresponding Study Island lesson is:
24. Cell
Please complete the above study island assignment by 4pm 1/10/13.

Student Learning Targets

- I will be able to explain that there are single-celled and multi-cellular organisms on Earth.
- I will be able to explain that multi-cellular organisms have a variety of specialized cells that perform specialized functions.
- I will be able to explain that multi-cellular organisms have an organization to them from organelle to cell to tissue to organ to organ system to whole organism and that all parts must work together for the whole organism to survive.
- I will be able to identify key features that plant cells have and animal cells do not (e.g., cell wall and chloroplasts).

Cell & Organisms Vocab. Terms

Tissues- a substance made of many cells that work together to perform a specific function.

Specialized cell- cells that only have small tasks; they are only found in specific organs or tissue.

Specialized functions- a particular task

Organs- a grouping of different tissues combine together into one substance to perform a main job in the body

Organ systems- a group of organs that work together to perform a certain task.

Cells- compartments that hold all of the biological equipment necessary to keep an organism alive

Organelles- differentiated structure within a cell, such as a mitochondrion, vacuole, or chloroplast, that performs a specific function

Cell wall- A rigid layer that supports and protects plant cells.

While you wait, unscramble these related words!

- 1) LCESL
- 2) SROGNA
- 3) ISTSEUS
- 4) MYSETS
- 5) GENORLESAL

ANSWERS!

This is what we're going to learn about today!

- 1) LCESL=CELLS
- 2) SROGNA=ORGANS
- 3) ISTSEUS=TISSUES
- 4) MYSETS=SYSTEM
- 5) GENORLESAL=ORGANELLES

Cells are the Starting Point

All living organisms on Earth contain at least one cell.

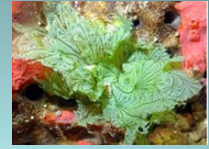
- Cells are small compartments that hold all of the biological equipment necessary to keep an organism alive and successful on Earth.
- Cells contain everything that is necessary for life. They have a variety of parts, and each part has a different set of functions. Cells may be part of a multi-celled organism, or they may be single-celled organisms



Cells are the Starting Point

Single-celled organisms perform all their life processes with a single cell. All cells can be further broken down into smaller pieces that include **proteins** and **organelles**.

- Multi-celled organisms are divided into pieces called cells, but there are also larger pieces to a multi-cellular organism called **tissues** and **systems**.
- Cells in multi-cellular organisms are specialized depending upon which part of the body they are located.



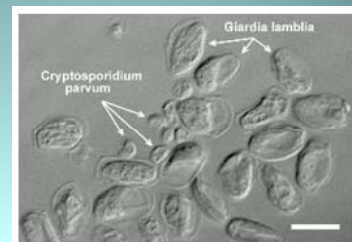
Single-celled Organisms

- Single-celled, or unicellular, organisms may live alone or as part of a colony. For single-celled organisms, each cell by itself can get food and air. Many single-celled organisms can move themselves through their environments. Single-celled organisms can reproduce themselves, although some do reproduce sexually.



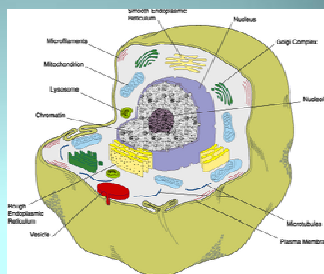
Single-celled Organisms

- Single-celled organisms include protozoa, bacteria, and some kinds of fungi. The image on the previous slide is a single protozoan. Its internal structure is visible. The image on the right shows two different kinds of protozoans.



What are cells made of?

- **Organelles**
 - are groups of complex molecules that help a cell survive.
- Root word "organ"
- Our organs keep us alive, just like organelles keep cells alive



Cell Functions

- Cells perform many of the functions that are needed to sustain life. These functions include:
 - growth and repair
 - taking in nutrients
 - producing energy
 - disposing of wastes

To learn more about the cell structure and the function of the organelles try playing



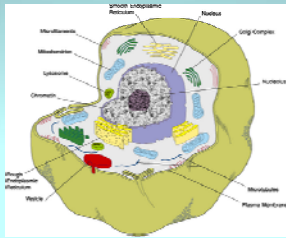
at: <http://armorgames.com/play/6347/cellcraft>

In **CellCraft** you begin your life as a single celled organism and a mysterious figure guides you through the organelles that help you function. You also learn how to find glucose (food) and turn it into ATP (energy). As you work your way through the game you get all the organelles your cell needs.



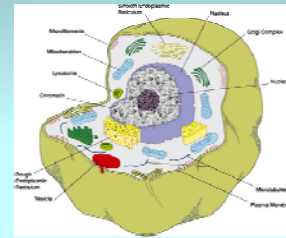
Mini Quiz

- _____ act like organs in a cell, they keep cells alive and functioning.



Mini Quiz

- **Organelles** act like organs in a cell, they keep cells alive and functioning.



Multi-celled Organisms

- Multi-celled, or multi-cellular, organisms may have many different kinds of cells. Each kind of cell has its own purpose and specialized parts that help the cell to carry out its function. Cells from multi-celled organisms **CANNOT** survive on their own.
- The cells must work together in order to get food and air and to help the organism reproduce.

Multi-celled Organisms

- Multi-celled organisms may be very small and made up of only a few cells, or very large and made up of trillions and trillions of cells.
- All plants and animals are multi-celled organisms. Both the tiny mite shown below on the left and the algae shown below on the right are examples of multi-celled organisms.



Cell Specialization

- Cell specialization is only found in multi-cellular organisms. Cell specialization is when different cell types perform different necessary and specific functions for the survival of the organism.
- In complex, multi-cellular organisms, such as humans or other animals and plants, different cells are needed to perform different, specialized jobs for the organism.
- Some specialized cells in the human body include:
 - nerve cells
 - bone cells
 - muscle cells
 - reproductive cells
 - red and white blood cells

Cells: Size & Shape

Cell size and shape depend upon its function.

EXAMPLES:

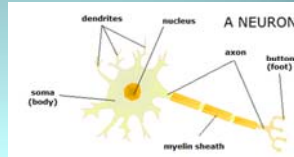
- Red blood cells are small and disc shaped to fit through the smallest blood vessel.
- Muscle cells are long and thin. The muscle cell has a structure that allows it to relax or contract as needed.
 - When they contract they produce movement.
- Nerve cells which carry signals to the brain are very long.



Cell Specialization

- For example, the diagrams below show two different types of human cells — a nerve cell (called a neuron) and a red blood cell.

The structure of a nerve cell allows it to more easily transmit nerve signals.



The red blood cell shown has a simple structure. Red blood cells carry oxygen to all parts of the body.



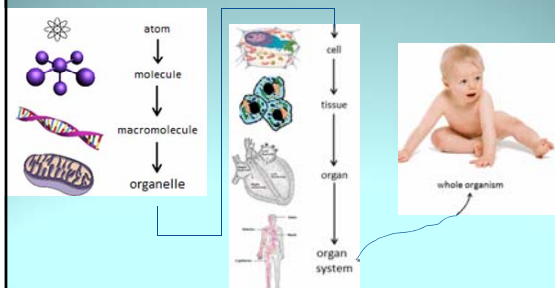
It's all related!

- Organelles** work together to keep **cells** alive.
- Cells that work together to perform a specific function form **tissue**.
- Just as cells that work together form a tissue, tissues that work together to form an **organ**.
- Organs that work together to perform a function form a **system**. Example: circulatory system.



Organization in Multi-cellular Organisms

- From simplest to most complex, the proper levels of organization in multi-cellular organisms are:



Understanding the parts of Multi-cellular Organisms

Organelles are specialized subunits in the cell, which each have their own specific function. They are usually enclosed in their own lipid membrane. There are many types of organelles, such as ribosomes, nuclei, endoplasmic reticulum, and lysosomes.

Cells are the structural and functional units of all living organisms. Organisms can be made up of one cell, like bacteria, or many cells, like animals. Cells specialize depending upon which part of the body they are located. All cells come from other cells, and they divide by mitosis or meiosis. Cells contain organelles and the genetic information of an organism.

Understanding the parts of Multi-cellular Organisms

Tissues are composed of many cells that work together to perform a specific function. Tissue covers most parts of an organism. There are several types of tissues, such as connective tissue, muscle tissue, nervous tissue, and epithelial tissue.

Organs are composed of several tissues and perform one or more functions in the body. In most organs there is a unique 'main' type of tissue (such as the myocardium of the heart) and several other tissues that are found in many organs (such as connective tissue). The body is made up of many organs, including the heart, lungs, liver, eyes, and brain.

Understanding the parts of Multi-cellular Organisms

Organ systems are groups of related organs that work together to perform a function or set of functions. The functions of the various organ systems usually overlap and are influenced by each other. There are eleven major organ systems in the human, including the respiratory, reproductive, digestive, skeletal, muscular, nervous, circulatory, endocrine, urinary, integumentary, and lymphatic systems. There are two main organ systems in vascular plants, the root system and the shoot system.

The **whole organism** is composed of all of the various organ systems. Its functions are carried out by cooperation between all of the systems.

Mini Quiz

- Create a sequence that correctly shows the order from simplest to most complex in multicellular organisms.

→ → →

Word Bank:
organ, tissue, organ system, cell

Mini Quiz

- Create a sequence that correctly shows the order from simplest to most complex in multicellular organisms.

Cell → tissue → organ → organ system

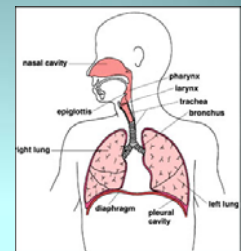
The Circulatory System: Transports oxygen, nutrients, and waste through the blood.

- Main parts involved:
 - Blood
 - Arteries, Capillaries, Veins
 - Lungs and Heart



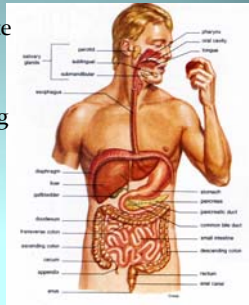
The Respiratory System -Transports air to lungs where oxygen is pulled out and transported all over the body by the Circulatory System.

- "Breathing System"
- Main parts involved:
 - Pharynx, Larynx, Trachea, Bronchial Tubes
 - Lungs



The Digestive System

- The Digestive System- Transports nutrients and waste from the food you eat throughout your body.
- Digestion begins with chewing food, ends with using the restroom.
- Main parts used:
 - Salivary Glands, Tongue, Esophagus, Stomach, Liver, Pancreas, Small Intestine, Large Intestine.



The Excretory System -removes wastes that were once in the blood from the body

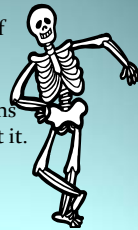
- Cell wastes include carbon dioxide and ammonia.
- Main Parts: Liver, kidneys, bladder, and skin.
- Sweating and Urination! EWW!



The Skeletal System



- **Skeleton**-made up of hundreds of **bones**.
- The rest of our systems couldn't exist without it.



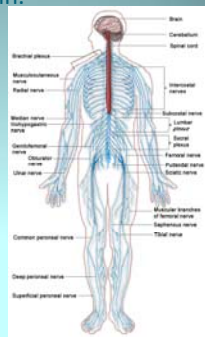
The Muscular System

- **Voluntary Muscles:** move bones and hold your skeleton upright.
- **Smooth Muscles:** contract slowly and move substances through the organs they surround.
- **Cardiac Muscles:** make up the walls of the heart. Their function is to pump blood.



The Nervous System: Connects all the tissues and organs to your brain.

- It's how we think, feel, hear, move, see, taste, smell, and more!
- Consists of two parts:
 - Central Nervous System
 - brain and spinal cord
 - Peripheral Nervous System
 - sensory organs, such as eyes, ears and body nerves.



Mini Quiz

- The _____ system transports oxygen, nutrients, and waste through the blood.
- The _____ system transports air to lungs where oxygen is pulled out and transported all over the body by the Circulatory System.

Word Bank:

Excretory Digestive Skeletal Respiratory
Circulatory Nervous Muscular Immune

Mini Quiz

- The **Circulatory** system transports oxygen, nutrients, and waste through the blood.
- The **Respiratory** system transports air to lungs where oxygen is pulled out and transported all over the body by the Circulatory System.

Mini Quiz

- The _____ system transports nutrients and waste from the food you eat throughout your body.
- The _____ system removes wastes that were once in the blood from the body.
- The _____ system supports your body and all the systems in it.

Word Bank:

Excretory Digestive Skeletal Respiratory
Circulatory Nervous Muscular Immune

Mini Quiz

- The **Digestive** system transports nutrients and waste from the food you eat throughout your body.
- The **Excretory** system removes wastes that were once in the blood from the body.
- The **Skeletal** system supports your body and all the systems in it.

Mini Quiz

- The _____ system is attached to the skeletal system, which holds it upright. Also moves solids/liquids throughout our organs.
- The _____ system connects all of our tissues and organs to the brain; controls our senses and movement.

Word Bank:

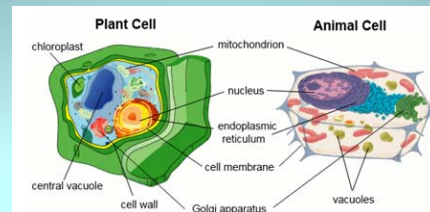
Excretory Digestive Skeletal Respiratory
Circulatory Nervous Muscular Immune

Mini Quiz

- The **Muscular** system is attached to the skeletal system, which holds it upright. Also moves solids/liquids throughout our organs.
- The **Nervous** system connects all of our tissues and organs to the brain; controls our senses and movement.

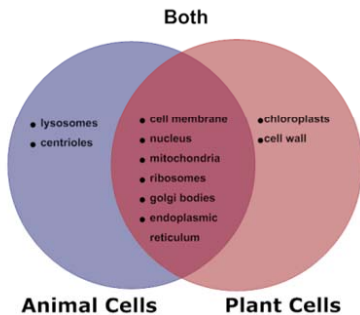
What are cells made of?

- Different kinds of cells can have different organelles. A plant cell and an animal cell are shown below. They have some of the same kinds of organelles, but the plant cell also has some organelles that the animal cell does not



What are cells made of?

The Venn diagram below compares the parts of plant and animal cells.



What are cells made of?

Plant and animal cells share many of the same organelles. The structures that can be found in both plant and animal cells are discussed in the list that follows.

- The **nucleus** is the control center of the cell. It contains *chromosomes*. The information in the chromosomes control cell metabolism and heredity.
- The **ribosomes** are organelles that participate in the production of proteins.
- The **mitochondria** take in nutrients, break them down, and create energy for the cell.

What are cells made of?

The **cytoplasm** is the suspension fluid that contains all of the organelles of the cell located between the nucleus and the cell membrane, as well as the support structures that help give the cell its shape. It is also the site of most of the chemical reactions that take place in the cell.

- The **cell membrane** (or plasma membrane) acts as a boundary layer around the cytoplasm that separates a cell from its outside environment. In addition to being able to recognize chemical signals, the cell membrane is selectively permeable to chemicals, and it controls which substances enter and leave the cell. Nutrients first enter the cell through the cell membrane.

What are cells made of?

A **vacuole** stores water and ingested food in a fluid sack and helps remove waste from the cell. While both plant and animal cells can have vacuoles, the vacuoles found in animal cells are very small, while plant cells have one large, central vacuole. The central vacuole in plants produces turgor pressure against the cell wall for cellular support.

- While plant and animal cells share many organelles, there are a few organelles that are specific to plant cells.
- These organelles include the cell wall and chloroplasts

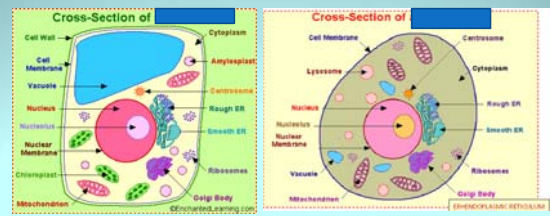
Organelles that are specific to plant cells.



- The **cell wall** provides protection from physical injury and, with the vacuole, it provides structural support. It is made mostly of a structural material called *cellulose*, which makes plant cells more rigid than animal cells.
- The **chloroplasts** are the food producers in a plant cell. These small green organelles contain a substance called *chlorophyll* to trap energy from the Sun during photosynthesis

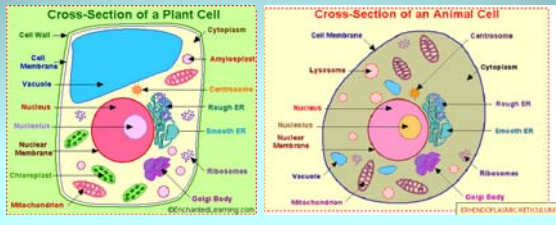
Mini Quiz

- _____ cells have a cell wall, and _____ cells do not.



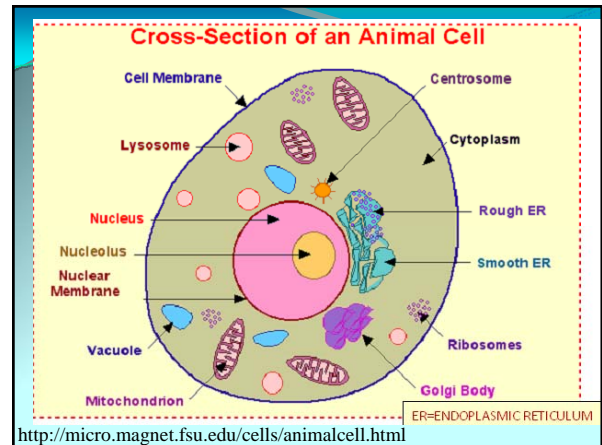
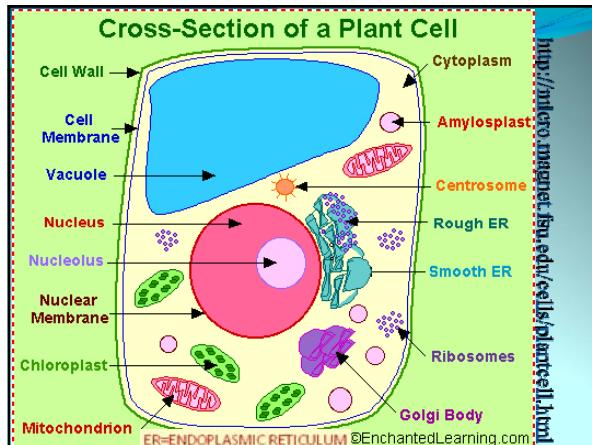
Mini Quiz

- Plant cells have a cell wall, and animal cells do not.



Plant Cells vs. Animal Cells

Plant Cell Organelles		Animal Cell Organelles	
Nucleus: The organelle that determines all of a plant cell's activities and produces new cells.	Vacuole: An organelle that stores food, water, and waste.	Nucleus: The organelle that determines all of the animal cell's activities and produces new cells.	Vacuoles: Organelles that store food, waste, or water.
Chromosomes: Threadlike structures that contain information about the plant.	Mitochondria: Organelles that release energy from food.	Chromosomes: Threadlike structures that contain information about the animal.	Mitochondria: Organelles that release energy from food.
Cell Membrane: A covering that holds the plant cell together and separates it from surroundings.	Chloroplasts: Organelles that make food for the plant cell.	Cell Membrane: A covering that holds the animal cell together and separates it from its surroundings.	Ribosomes: tiny organelles composed of about 60% RNA and 40% protein. Found in both eukaryotes and prokaryotes.
Cytoplasm: A jellylike substance that contains many chemicals to keep the cell functioning.	Cell Wall: A rigid layer that supports and protects plant cells.	Cytoplasm: A jellylike substance that contains many chemicals to keep the cell functioning.	



So to recap...

- All living things are made of one or more **cells**. Cells are the basic building blocks of all organisms.
- The organization of cells into complex structures allows for the wide variety of life found in multi-cellular organisms.
- Cells make up tissues, tissues make up organs, organs make up systems, and systems run our bodies.

Cell Functions

- Cells of multicellular organisms are responsible for the organisms' **growth**. Cells must multiply as the organism grows. This is because the size of individual cells does not change very much. When an organism needs to grow bigger, it must make more cells. The body of a multicellular organism can also **repair** itself by using cell division to make more cells.
- Cells must **take in nutrients** in order to perform life processes. The cell membrane of a cell allows the cell to take in nutrients (or food molecules) while keeping out things that are bad for the cell. Plant cells that contain chloroplasts can also make their own food by using energy from the Sun.

Cell Functions

- Cells use the nutrients that they acquire to **produce energy**. The mitochondria found in both plant and animal cells use nutrients to make a substance called ATP. Cells then use ATP as their main source of energy.
- After a cell has acquired and used nutrients for cellular processes, the cell must be able to **dispose of waste materials**. During waste removal, the cell membrane works with other cell organelles to move waste products from an area of higher concentration (inside the cell) to an area of lower concentration (outside the cell).

Cell & Organisms Vocab. Matching

- Tissues- compartments that hold all of the biological equipment necessary to keep an organism alive
- Specialized cell- a substance made of many cells that work together to perform a specific function.
- Specialized functions- cells that only have small tasks; they are only found in specific organs or tissue.
- Organs- a grouping of different tissues combine together into one substance to perform a main job in the body
- Organ systems- A rigid layer that supports and protects plant cells. a particular task
- Cells- a group of organs that work together to perform a certain task.
- Organelles- differentiated structure within a cell, such as a mitochondrion, vacuole, or chloroplast, that performs a specific function
- Cell wall-

OAA Writing

- A student has four microscope slides of cells from four different organisms. He must match the slides of cells with the correct organism tissue listed in the table. He recognizes chloroplasts in the cells on one of the slides. Explain which slide he is viewing.

Slide	Cell
P	Fish Skin
Q	Alligator Hide
R	Plant Leaf
S	Tadpole Skin

OAA Writing

- A student has four microscope slides of cells from four different organisms. He must match the slides of cells with the correct organism tissue listed in the table. He recognizes chloroplasts in the cells on one of the slides. Explain which slide he is viewing.

Only plant cells have a cell wall
A chloroplast

Slide R

Can't be an Animal cell
B They don't have it.

The student is viewing slide R. First I know this because only plant cells have chloroplast in them and slide R is the only plant in the list. Second, I know that animal cells like those in skin and scales would not have chloroplast because they are not plants.

Slide	Cell
P	Fish Skin
Q	Alligator Hide
R	Plant Leaf
S	Tadpole Skin

Web resources

- Cell Craft game:
 - <http://anmorgames.com/play/6347/cellcraft>
- Animal Cells:
 - <http://micro.magnet.fsu.edu/cells/animalcell.html>
- Plant Cells:
 - <http://micro.magnet.fsu.edu/cells/plantcell.html>

THANKS!

- Thanks for coming to class today!
- You may now leave, or you may stay to chat with your fellow classmates for a couple of minutes:
 - Keep it classy! No rude remarks, be kind.
 - Keep it private! No personal information is to be given out. Use the Big Think to contact each other.