# Chapter 3: Cell Structure

Cells are the basic building blocks for all \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_…it is important to understand their structures and functions

CH3.1

|  |  |
| --- | --- |
| **Objectives** | **Vocabulary** |
| * **Describe** how scientists measure the length of objects. * **Relate** magnification and resolution in the use of microscopes. * **Analyze** how light microscopes function. * **Compare** light microscopes with electron microscopes. * **Describe** the scanning tunneling microscope. | Light microscope  Electron microscope  Magnification  Resolution  Scanning Tunneling Microscope |

Most cells are too small to be seen with the naked eye

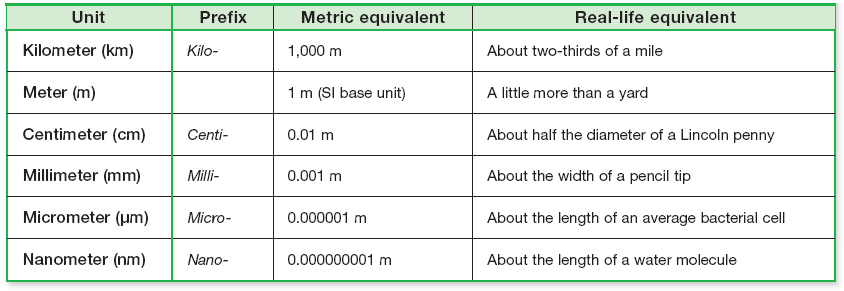
* Scientists were not aware of cells until they invented the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Anton van \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ was the first person to view single-celled organisms
  + He viewed pond water with a microscope and observed many living creatures that he called \_\_\_\_\_\_\_\_\_\_
* In \_\_\_\_\_\_\_\_, an English scientist named Robert \_\_\_\_\_\_\_\_\_ observed a thin piece of \_\_\_\_\_\_\_\_\_ using a microscope. He saw that the cork contained tiny “rooms” that reminded him of the rooms that monks lived in called \_\_\_\_\_\_\_\_\_\_\_
  + You can also think of a \_\_\_\_\_\_\_\_\_\_\_\_ cell

Cell measurements taken by scientists are expressed in \_\_\_\_\_\_\_\_\_\_\_\_ units.

* The official name of the metric system is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of Measurement…abbreviated \_\_\_\_\_
* SI is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ system, so all relationships between SI units are based on powers of \_\_\_\_\_\_\_\_\_\_
* There are seven SI base units…

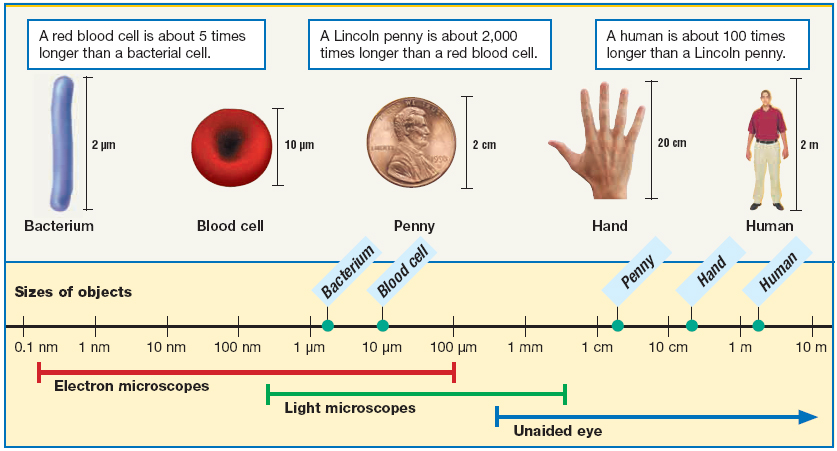
|  |  |  |
| --- | --- | --- |
| Measurement | Unit | Symbol |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Most SI base units have a \_\_\_\_\_\_\_\_\_\_\_\_ that indicates the relationship of that unit to a base unit



What prefix on the chart indicates the smallest size?

* What prefix is usually used for cell sizes?



**When looking at a cell with a microscope, it is necessary to have good…**

* + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the quality of making an image appear \_\_\_\_\_\_\_\_\_\_\_\_\_ than its actual size
  + **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is a measure of the \_\_\_\_\_\_\_\_\_\_\_ of an image

There are three main types of microscopes…

* + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ microscope
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ microscope
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ microscope
* Light microscopes use \_\_\_\_\_\_\_\_\_\_\_ to magnify an image
  + Simple light microscopes use \_\_\_\_\_\_\_\_\_ lens
  + Compound light microscopes use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lenses
* An image produced by a microscope is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + They are labeled with the…
    - Specimen
    - Type of microscope
    - magnification
* Light waves are too \_\_\_\_\_\_\_ to clearly magnify objects smaller than a few \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Electron beams are \_\_\_\_\_\_\_\_\_\_\_\_\_ than light waves so electron microscopes can magnify smaller objects with better \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The electron beam and specimen must be in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so that the electron beam will not bounce off of \_\_\_\_\_\_\_\_\_ molecules.
  + This prevents \_\_\_\_\_\_\_\_ organisms from being viewed with an electron microscope

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Electron Microscope**

* The electrons that pass through strike a fluorescent screen, forming an image that allows you to see \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ structures

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Electron Microscope**

* An electron beam is focused on a specimen producing an image that shows \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ details of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a specimen.

**Scanning Tunneling Microscope**

* A needle-like probe measures differences in \_\_\_\_\_\_\_\_\_\_\_\_\_\_ caused by electrons that leak, or \_\_\_\_\_\_\_\_\_\_\_\_, from the surface of the object being viewed.
* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tracks the movement of the probe and produces a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ image of the surface of the specimen.
* STMs allow \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ specimens and objects as small as \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to be viewed!

1. What metric prefix is used most often while measuring cells?
2. What is the difference between magnification and resolution?
3. What is the difference between a simple and compound microscope?
4. Which type of electron microscope allows you to see internal cell structures?
5. Which type of microscope allows you to observe live specimens and objects as small as an atom

CH3.2

|  |  |  |
| --- | --- | --- |
| Objectives | Vocabulary | |
| * **List** the three parts of the cell theory. * **Determine** why cells must be relatively small. * **Compare** the structure of prokaryotic cells with that of eukaryotic cells. * **Describe** the structure of cell membranes. | Cell theory  Cell membrane  Cytoplasm  Cytoskeleton  Ribosome  Prokaryote  Cell wall  Flagellum  Eukaryote | Nucleus  Organelle  Cilium  Phospholipid  Lipid bilayer |

After Robert Hooke named the “cell” in 1665, it took many scientists who were working together \_\_\_\_\_\_ years to understand what a cell was

* Matthias \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, a German botanist, viewed many plants under a microscope
  + - In 1838, he concluded that all plant parts are made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* One year later, in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, Theodore \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_concluded

that all \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ parts are made of cells *Hint…Schwann sounds like swan*

* In 1858, Robert \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ determined that all cells come from

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells that reproduced

The work of these three scientists are the basis for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which has three parts:

1. All living things are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of one or more cells.
2. Cells are the basic units of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in organisms.
3. All cells arise from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells.

**Cell Size**

* Cells cannot grow too large because small cells

function more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than large cells

* **This is due to the fact that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ increases more quickly than \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* The surface area of this cube represents the cell \_\_\_\_\_\_\_\_\_\_\_\_. Its volume contains all of its cell \_\_\_\_\_\_\_\_\_\_
* If each side of the cube is 1mm long, what is its surface area?
  + Find the area of one side and multiply by \_\_\_\_ to find the total area of all the sides
    - Area = 1 mm x 1mm = \_\_\_\_\_\_\_\_\_
    - Surface area = \_\_\_\_\_\_\_\_ x \_\_\_\_\_ =
* Find the volume of this cube
  + Volume = length x width x height
    - Volume = \_\_\_\_ x \_\_\_\_ x \_\_\_\_ = \_\_\_\_\_\_
  + So this cell’s surface area to volume ratio is…
* Find surface area and volume for a cube with sides that are 2mm long
* S.A. =
* Volume =
* So the s.a. to volume ratio of this cube is…
* Find surface area and volume for a cube with sides that are 4 mm long
* S.A. =
* Volume =
* So the s.a. to volume ratio of this cube is…

Ratios can also be written as fractions

* If a cell’s surface area–to-volume ratio is too \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, substances cannot enter and leave the cell well enough to meet the cell’s needs.
* So if the cell grows too big, it won’t be able to get enough food \_\_\_\_\_\_\_ or waste \_\_\_\_\_\_ fast enough to survive
* The same applies for food particles in a cell, so large cells end up \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from lack of food or being \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by waste

1. Who studied plants…Schleiden or Schwann?
2. What are the three parts of the cell theory?
3. Why must cells be relatively small?

* **All cells share some common structural features, including...**
  + an outer boundary called the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
  + interior substance called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
  + genetic material in the form of **\_\_\_\_\_\_\_\_\_\_**
  + cellular structures that make proteins, called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**There are 2 types of cells…**

* + **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
  + **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |
| --- | --- |
| **Prokaryotes** | |
| Untitled-36 copy | * \_\_\_\_\_\_\_\_\_\_\_\_\_\_ celled organisms * Lack a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and other internal compartments * Without separate compartments, prokaryotes cannot carryout many   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ functions |

* Early prokaryotes lived at least \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ years ago
* Modern prokaryotes are commonly known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Instead of being in a nucleus, DNA is found in single, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ molecule
* Ribosomes and enzymes are free to \_\_\_\_\_\_ around in the cytoplasm
* Prokaryotes also have an \_\_\_\_\_\_\_\_\_ cell membrane, which is also called a \_\_\_\_\_\_\_\_ membrane and an \_\_\_\_\_\_\_\_ cell wall
* The cell wall provides \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for prokaryotic cells
* Other organisms, like \_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_, and some \_\_\_\_\_\_\_\_\_\_\_\_\_ have cell walls but \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ do not!
* Some prokaryotes are also surrounded by a structure called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which provides \_\_\_\_\_\_\_\_\_\_\_\_\_ and enables prokaryotes to \_\_\_\_\_\_\_\_ to almost anything, including teeth, skin,

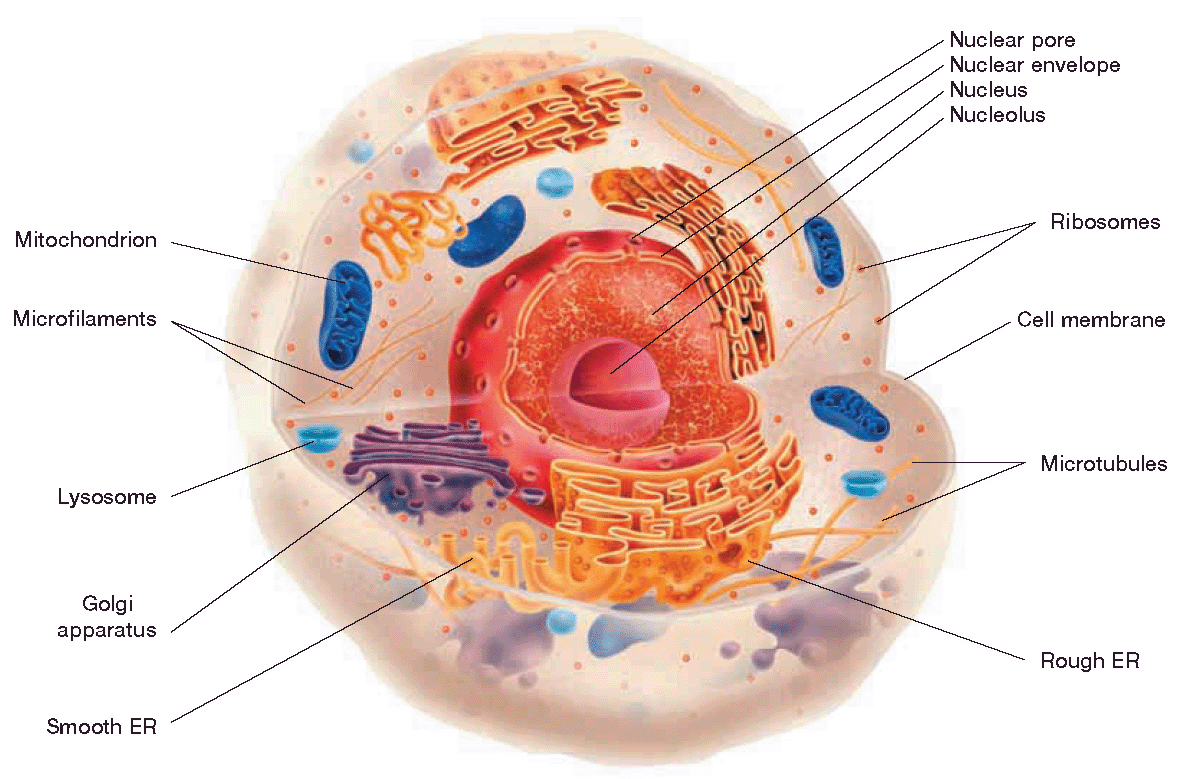
and food

* Prokaryotes may also have \_\_\_\_\_\_\_\_\_\_\_ (singular = pilus) that aid in sexual reproduction and long extensions called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (singular = flagellum) that aid cell movement
* Flagella move in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or rotate

**Eukaryotes**

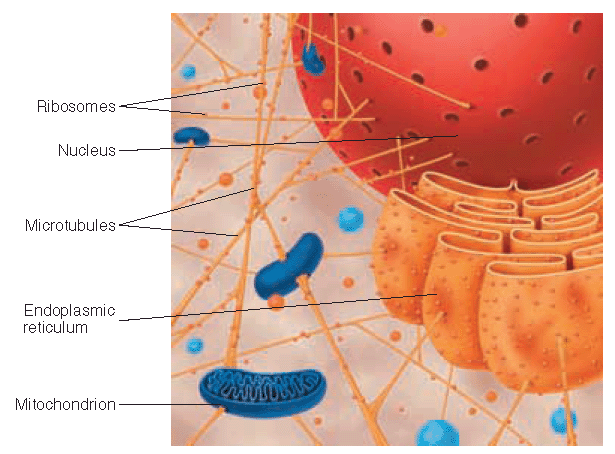
Eukaryotic cells have:

* A **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** which contains the cell’s DNA
* Other internal compartments called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.



* Organelles allow eukaryotic cells to carryout many \_\_\_\_\_\_\_\_\_\_\_\_\_\_ activities at once
* The first eukaryotes evolved \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ years ago
* Eukaryotic cells are typically \_\_\_\_\_\_\_\_\_\_\_ than prokaryotic cells and take \_\_\_\_\_\_\_\_\_\_ to divide
  + Prokaryote \_\_\_\_\_\_ minutes
  + Eukaryote \_\_\_\_\_\_\_ hours
* Eukaryotes may be unicellular, like \_\_\_\_\_\_\_\_\_\_\_, or multicellular like \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_, and most \_\_\_\_\_\_\_\_\_\_\_\_
* Single celled eukaryotes may move by using flagella or \_\_\_\_\_\_\_\_\_\_\_\_
  + Cilia are \_\_\_\_\_\_\_\_\_, hair like extensions that move back and forth

|  |  |
| --- | --- |
| Specialized eukaryotic cells, such as those found along the lining of the respiratory system,  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ out debris and mucus from air passages |  |



* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ provides the interior \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of an animal cell.
* Consists of an intricate network of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ fibers that are attached to the inside of the plasma membrane and other organelles. They are found throughout the cytoplasm. The fluid in the cytoplasm is

called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Cytoskeleton**

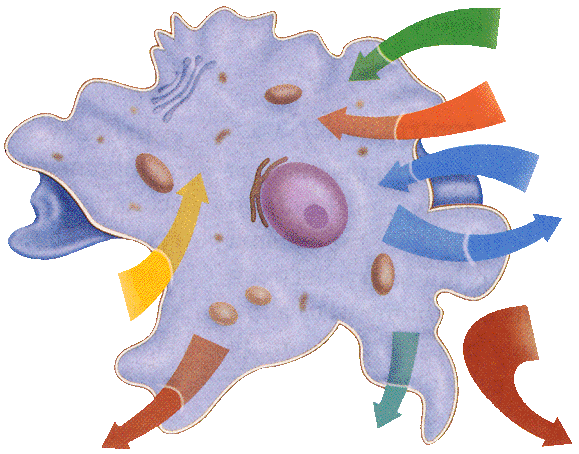
* There are three basic kinds of cytoskeletal fibers.

1. **Microfilaments:** long slender filaments made of the protein \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **Microtubules:** \_\_\_\_\_\_\_\_\_\_ tubes made of the protein \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **Intermediate fibers:** thick \_\_\_\_\_\_\_\_ made of protein.

* Microfilaments can \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_, which determines the shape of animal cells. Some protists also use microfilaments to move. The extensions on this amoeba are helping It to move from one location to another
  + The extensions are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which means “false feet
  + This type of movement is called cytoplasmic\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Microtubules act as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ system for transportation of information from the nucleus to other parts of the cell
* Think of microtubules as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. There are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that move along the microtubules to transport different items
* Intermediate fibers provide a frame that anchors certain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and ribosomes to a particular region of the cell
* By keeping these enzymes in one location, the cell can organize complex\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ activities efficiently

**The Cell Membrane**

* The **cell membrane** is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ barrier that determines which substances enter and leave the cell.
* Think of a pasta strainer
  + What does the strainer “select” for, or what passes through?
  + What does not pass through?
* The **selective permeability** of the cell is mainly caused by the way \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ interact with water.
* A **phospholipid** is a lipid made of a \_\_\_\_\_\_\_\_\_\_\_ group and two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ chains
* The phopshate group is commonly called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and it is \_\_\_\_\_\_\_\_\_\_\_\_
  + So it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



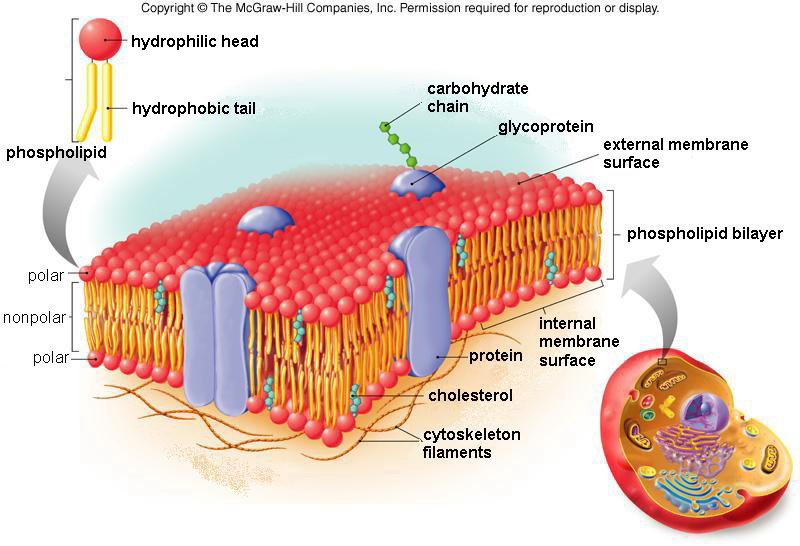
* The fatty acid chains are commonly called \_\_\_\_\_\_\_\_
* and they are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + So it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is found inside and outside of the

Cell so the tails must arrange themselves \_\_\_\_\_\_\_\_\_ from water

* Cell membranes are made of a \_\_\_\_\_\_\_\_\_\_\_\_ layer of

phospholipids, called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

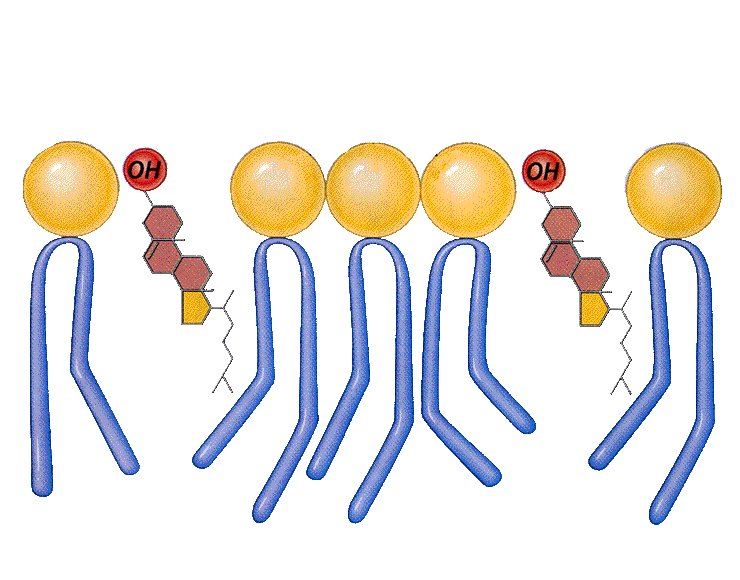
* The tails are on the \_\_\_\_\_\_\_\_\_\_\_\_ and the heads are on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[](http://www.google.com/url?sa=i&rct=j&q=plasma+membrane&source=images&cd=&cad=rja&docid=M78w90ZdrzbrIM&tbnid=LXvdqB3ue_iXxM:&ved=0CAUQjRw&url=http://legacy.hopkinsville.kctcs.edu/instructors/Jason-Arnold/VLI/Module%202/m2cellstructure/m2cellstructure3.html&ei=IkN9Ut3-JY_rkQefkIDAAg&bvm=bv.56146854,d.eW0&psig=AFQjCNE2oQD_hiyiNTbG9Q69eRoCqpfkLQ&ust=1384027256057297)

This arrangement prevents \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ polar molecules from moving freely through a cell membrane because they are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by nonpolar tails

The cell membrane also contains various proteins which are made up of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

As we learned in chapter 2, some amino acids are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and some are \_\_\_\_\_\_\_\_\_\_\_\_\_



|  |  |
| --- | --- |
| Types of Cell Membrane Proteins | Function |
|  |  |
|  |  |
|  |  |
|  |  |

Fluid Mosaic Model:

* The cell membrane contains many parts…like a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* It is also not \_\_\_\_\_\_\_\_\_\_\_\_\_, it is fluid and moves
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ molecules are also found throughout the cell membrane
  + They prevent the nonpolar tails from \_\_\_\_\_\_\_\_\_\_ to each other
  + Without cholesterol, the cell membrane could become rigid and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Which cell part do prokaryotes lack?
   * DNA
   * Plasma membrane
   * Nucleus



* + Ribosomes

1. What are the long extensions in this picture called?
2. Which part of the cytoskeleton can expand and contract?
   1. microfilaments
   2. microtubules
   3. Intermediate fibers
3. Are the polar heads in a phopholipid on the inside or outside of the bilayer?



1. What type of cell membrane protein is in the picture?
   1. Transport protein
   2. Receptor protein
   3. Enzyme
   4. Marker protein

Color & label the parts of the plasma membrane according to the instructions below

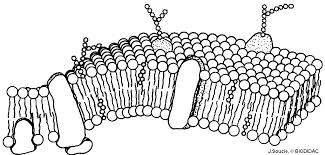
Phospholipid heads green

Phospholipid tails yellow

Cholesterol orange

Marker (Glycoproteins) blue

Other proteins red

[](http://www.google.com/url?sa=i&rct=j&q=plasma+membrane&source=images&cd=&cad=rja&docid=VeTy8nj62icEyM&tbnid=TPkrCrNhWK2NPM:&ved=&url=http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm?File_name%3DCELL004B%26File_type%3DGIF&ei=90J9UobXKInRkQf2hYHYAg&bvm=bv.56146854,d.eW0&psig=AFQjCNE2oQD_hiyiNTbG9Q69eRoCqpfkLQ&ust=1384027256057297)

CH3.3

|  |  |
| --- | --- |
| Objectives | Vocabulary |
| * **Describe** the role of the nucleus in cell activities. * **Analyze** the role of internal membranes in protein production. * **Summarize** the importance of mitochondria in eukaryotic cells. * **Identify** three structure in plant cells that are absent from animal cells. | Endoplasmic reticulum  Vesicle  Golgi apparatus  Lysosome  Mitochondrion  Chloroplast  Central vacuole |

In this section, we are studying eukaryotic cell organelles… Why are we no longer studying prokaryotes?

**The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* \_\_\_\_\_\_\_\_\_\_\_\_ most functions of a eukaryotic cell
* Located in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of animals cells and towards the \_\_\_\_\_\_\_\_\_\_ of plant cells
* The nucleus is surrounded by a \_\_\_\_\_\_\_\_\_\_\_ membrane called the **nuclear \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**
* There is a dense region in the center of the nucleus called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + It makes \_\_\_\_\_\_\_\_\_\_\_\_, which are the site of \_\_\_\_\_\_\_\_\_\_\_\_ synthesis
  + Ribosomes don’t have a membrane, they are made of compact strands of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** & \_\_\_\_\_\_\_\_\_\_\_\_
* The nuclear envelope also contains small openings called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. These pores allow substances made inside the nucleus, like ribosomes, to \_\_\_\_\_\_\_\_\_ and go to the rest of the cell
* DNA is also found inside the nucleus
  + When the cell is \_\_\_\_\_\_\_\_ dividing, the DNA is found in long thin strands called \_\_\_\_\_\_\_\_\_\_\_\_.
  + When the cell is dividing, the chromatin bundles up into rod-shaped objects called \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (ER)**

* After ribosomes leave the nucleus, they may travel to the endoplasmic reticulum
  + It is an extensive system of internal membranes that are kind of like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The ER carries out chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_ proteins through the cell. The many hallways of the ER provides more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for chemical reactions to occur
* **The portion of the ER with attached ribosomes is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ER.** The rough ER helps to \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ proteins that are made by the attached ribosomes.When the protein is completed, the portion of the ER containing the protein pinches to form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.** A vesicle is a small membrane bound \_\_\_\_\_\_\_\_\_\_\_\_ that transports substances throughout the cell**.** These proteins made in the rough ER will eventually \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the cell
* **The portion of the ER without attached ribosomes is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ER**
  + It makes \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and breaks down \_\_\_\_\_\_\_\_\_\_ substances

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ribosomes**

* Ribosomes are also found \_\_\_\_\_\_\_\_\_\_\_ in the cytosol so they are called “free”
* Free ribosomes make proteins that will stay \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the cell, such as those used to make new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Apparatus**

* Before a protein can do its specific job, it must be \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_ correctly
* Vesicles carry proteins to the golgi apparatus, which is kind of like the \_\_\_\_\_\_ plant and animal of the cell
* The Golgi apparatus is a set of \_\_\_\_\_\_\_\_\_\_\_\_\_, membrane-bound sacs that serve as the packaging and distribution center of the cell.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Special \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ found only in \_\_\_\_\_\_\_\_\_\_ cells that leave the golgi apparatus
* They contain digestive \_\_\_\_\_\_\_\_\_\_\_\_\_
* These enzymes break down….
  + Worn out \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_ particles
  + \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* When these substances are fully digested, vesicles \_\_\_\_\_\_\_\_\_\_\_ them from the cell

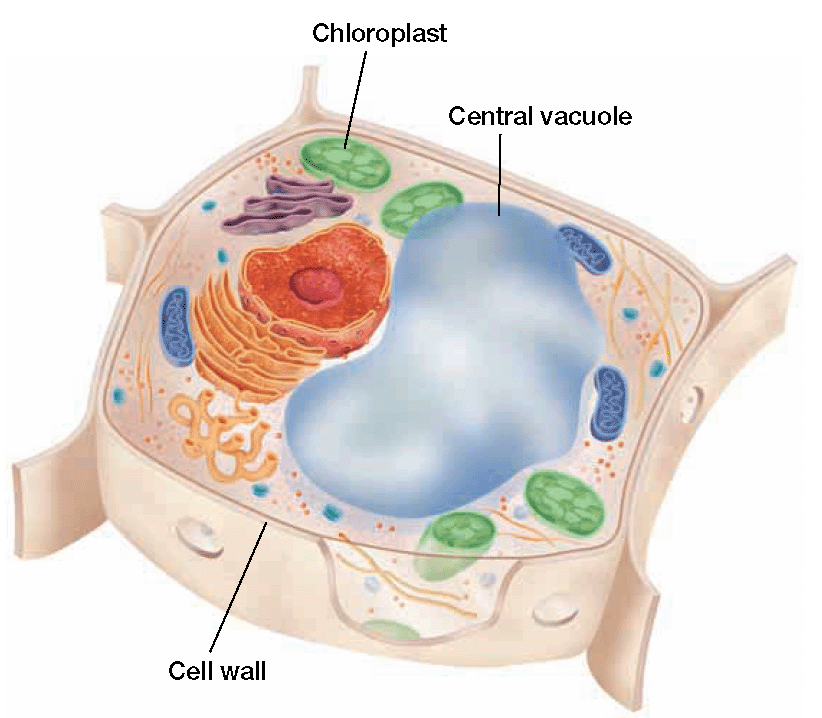
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Another cell part found only in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells. Occurs in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Help with cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Organelles that make energy in the form of \_\_\_\_\_\_\_ from organic compounds that you eat, like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Similar to the nucleus, mitochondria have \_\_\_\_\_ membranes
  + The outer membrane is \_\_\_\_\_\_\_\_\_\_\_\_
  + The inner membrane is \_\_\_\_\_\_\_\_\_\_\_\_, allowing more surface area for chemical reactions to occur
* Mitochondria have their own \_\_\_\_\_\_\_\_\_ so they can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on their own, independently of the cell. Their DNA is similar to the DNA of \_\_\_\_\_\_\_\_\_\_\_\_\_ cells. Because of this, mitochondria are thought to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of primitive prokaryotes
* **One theory, called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ theory, hypothesizes that mitochondria were \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into larger cells, eventually forming a eukaryote**

**Structures of Plant Cells**

****

Plants have three unique structures that are not found in animal cells:

-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Cell Wall

* Made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Functions
  + helps \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ the shape of the cell
  + \_\_\_\_\_\_\_\_\_\_\_\_ the cell from damage
  + \_\_\_\_\_\_\_\_\_\_\_ plant cells with adjacent plant cells

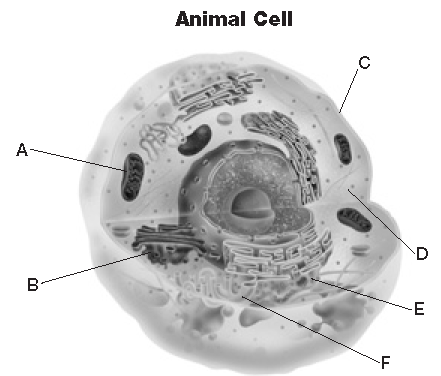
Chloroplasts

* Organelles that use \_\_\_\_\_\_\_\_\_ energy, \_\_\_\_\_\_, and \_\_\_\_\_\_\_ to make food called \_\_\_\_\_\_\_\_\_\_\_\_
* Has…
  + \_\_\_\_ membranes
  + Series of stacks called \_\_\_\_\_\_\_\_\_\_, that contain \_\_\_\_\_\_\_\_\_\_\_\_\_\_
* A \_\_\_\_\_\_\_\_\_\_ membrane surrounds the grana
  + It is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ membrane
* Like mitochondria, scientists propose that chloroplasts are \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of ancient prokaryotes and are a part of the \_\_\_\_\_\_\_\_\_\_\_\_\_ theory

Central Vacuole

* Takes up most of the \_\_\_\_\_\_\_\_\_\_ of a plant cell…pushes the \_\_\_\_\_\_\_\_\_\_ to the side
* The central vacuole stores…
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_& \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Label the parts of the cell below



1. Which structures in this cell are also found in prokaryotic cells?

A. *A* and *B*

B. *C* and *D*

C. *E* and *F*

D. *A* and *E*

1. Which features of plant cells are missing from this cell?

F. cell wall and chloroplasts

G. Golgi apparatus and mitochondria

H. rough ER and lysosomes

J. smooth ER and nucleus

1. What is the function of the structure labeled A?

A. making ATP

B. making carbohydrates

C. making proteins

D. moving proteins through the cell

1. Which of the following organelles does not have at least 2 membranes?

A. chloroplast

B. nucleus

C. golgi apparatus

D. mitochondria

1. Which of the following organelles are only found in animal cells?

A. nucleus and ER

B. centrioles and lysosomes

C. cell wall and cell membrane

D. ribosomes and mitochondria

