

Chapter 1 Cells: The Building Blocks Of Life



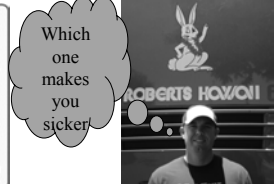
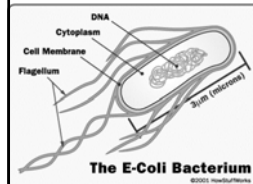
I should have paid more attention to Dorchak's Quote Of The Day!!!

Section 1 What is Life?

Living Things = Organisms = have cellular organization, contain similar chemicals, use energy to grow and develop, respond to their surroundings, and reproduce

Unicellular Organism = one cell = ex. Bacteria – this one cell does everything

Multicellular Organism = consist of many cells which carry out specific tasks

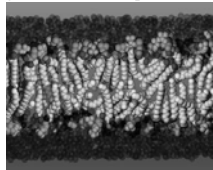
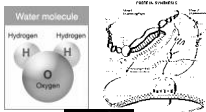


Which one makes you sicker?

-The Chemicals of life = water, carbohydrates, lipids, proteins, nucleic acids

-Cells use energy for growth, development, and repair of parts

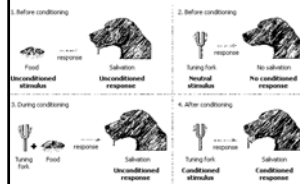
Development = process of change to a more complex organism



Response to surroundings = stimulus and reaction

Stimulus = a change to the organism surroundings that causes the organism to react

Response = an action or change in the behavior from a stimulus



Life Comes From Life

Spontaneous Generation = idea that living things arise from non living things – ex. Maggots and meat

Francisco Redi developed a controlled experiment to prove that flies did not come from rotting meat

Variable = one factor the scientist changes

Louis Pasteur = experiment to prove bacteria did not go through spontaneous generation



4 things for an organism to stay alive include

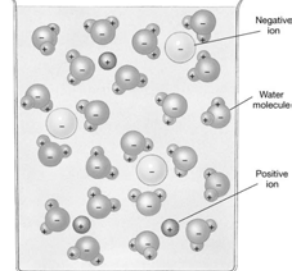
1. Energy
2. Water
3. Living Space
4. Stable internal conditions



Energy – can come from food, sun, thermal vents
 autotroph = an organism that can make its own food
 heterotroph = can not make their own food



Water = organisms use for obtaining chemicals from their surroundings, break down food, growth, move substances –
 - water is a great solvent = can dissolve chemicals – then can transport in the body



Living Space = organisms compete for space to live in – ex. Rain forest



Stable Internal Conditions = Homeostasis – if environment changes the organism needs to keep conditions inside the body constant
 ex. Human body heat, barnacle



Section 2: Discovering Cells

Cells = basic units of structure and function in living things – like bricks in a house – very small
 -around 1590 microscope invented to allow people to see very small objects = made it possible to discover and learn about cells

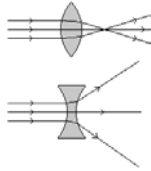
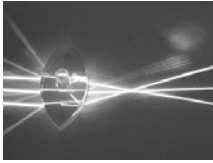
Cells Rule!
 I am so happy they discovered cells!!!



-Microscopes can use lenses to focus light, lasers or electrons
 -**Magnification** is how much an image is enlarged under a microscope.
 -**Resolution** is the amount of detail you can see in an image. You can enlarge a photograph indefinitely using more powerful lenses, but the image will blur together and be unreadable.
 -increasing the **magnification** will not improve the resolution. This is also known as the resolving power.

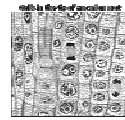


- The lens or lenses in a light microscope magnify an object by bending the light that pass through them
- Convex lens = center of the lens is thicker – light that passes through the sides is bent inward -> when light passes through and hits the eye it appears closer
- Compound microscope uses more than 1 lens = more magnification



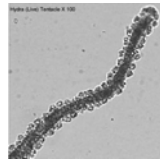
Compound Microscope

- Compound microscopes are light illuminated.
- The image seen with this type of microscope is two dimensional.
- most commonly used.
- You can view individual cells, even living ones. It has high magnification.
- it has a low resolution.
- cost \$150 - \$10,000
- use visible light
- medium = air
- 2 dimensional



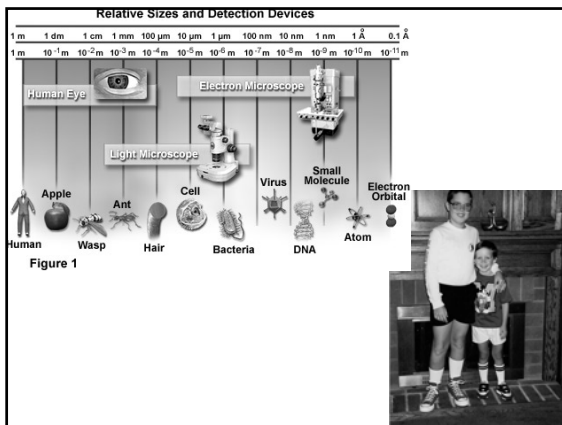
Dissection or Stereoscope

- A dissection microscope is light illuminated.
- The image that appears is three dimensional.
- It is used for dissection to get a better look at the larger specimen.
- You cannot see individual cells because it has a low magnification.
- cost \$100-\$1500
- uses visible light
- medium = air



Scanning Electron Microscope (SEM)

- SEM use electron illumination.
- The image is seen in 3-D.
- It has high magnification and high resolution.
- The specimen is coated in gold and the electrons bounce off to give you an exterior view of the specimen.
- The pictures are in black and white
- cost more than \$50,000
- uses Electrons
- medium is a vacuum



- Robert Hooke = one of first people to observe cells – English scientist – 1663
- Anton van Leeuwenhoek = Dutch amateur scientist used simple microscopes (1 lens) – first person to see bacteria



Robert Hooke

Anton van Leeuwenhoek

Robert Dorchak

Cell Theory

- 1) All living things are composed of cells
 - 2) Cells are the basic unit of structure and function in living things
 - 3) All cells are produced from other cells
- Previously thought that living things came from non living things
 - Because all cells come from cells, scientists can study cells to learn about growth, reproduction, and all other functions that living things perform

These cells are nasty!

So are the cells on your face!



Section 3 – Looking Inside Cells

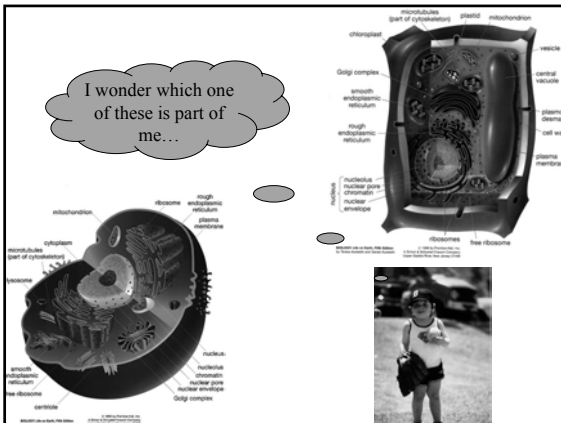
Organelles = tiny structures inside cells that carry out a specific function

Cell Wall = ridged layer of nonliving material located on the outside of a plant cell -> called cellulose (fiber) – helps to protect and support the cell – materials can pass through

Cell Membrane = all cells have – in animal cells forms boundary to separate from the environment – controls what substances can go into and out of the cell

Nucleus = cell control center – directs all the cells activities

I wonder which one of these is part of me...

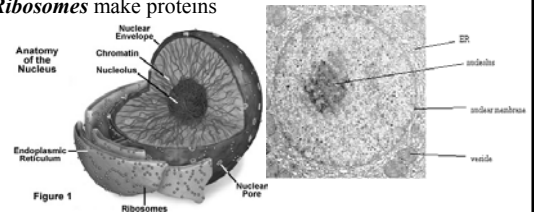


Nuclear Membrane = surrounds and protects the nucleus – materials can pass through pores

Chromatin = genetic material that holds the info of the cell (instructions or coding)

Nucleolus = where ribosomes are made

Ribosomes make proteins



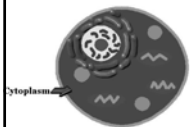
Organelles in the Cytoplasm

Cytoplasm = area between cell membrane and nucleus – gel-like fluid – many organelles found inside



U.S. National Library of Medicine

Cytoplasm



Mitochondria = powerhouse for the cell – muscle cells have many

Mitochondria Structural Features

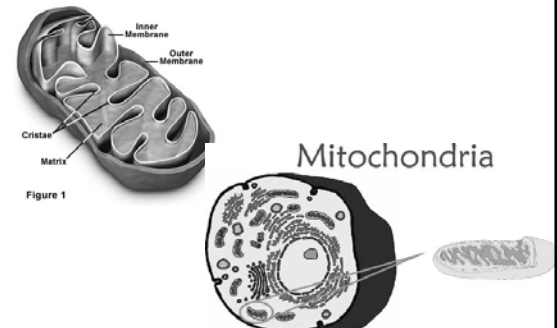
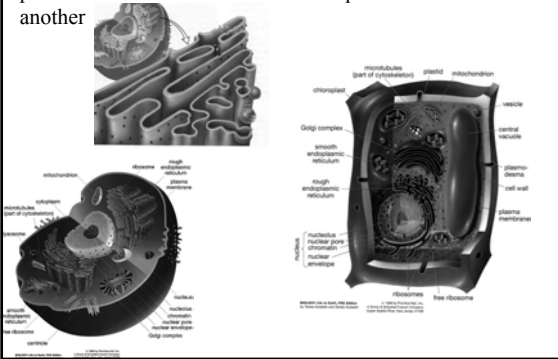


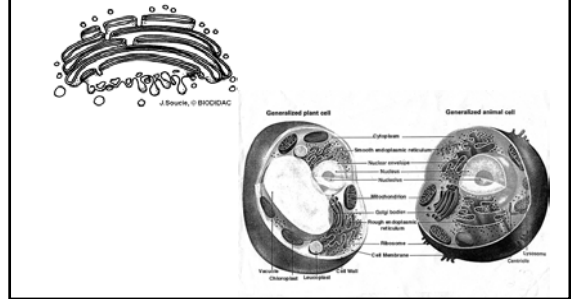
Figure 1

Mitochondria

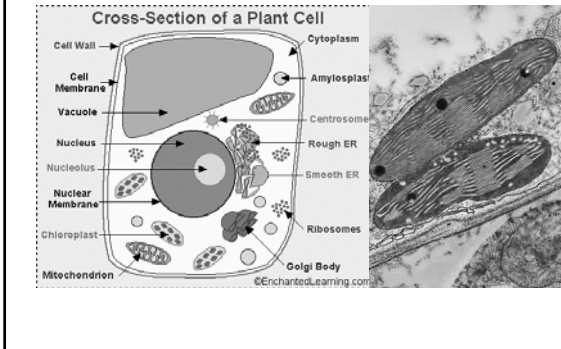
Endoplasmic Reticulum = (ER) – pathways that carry proteins and other material from one part of the cell to another



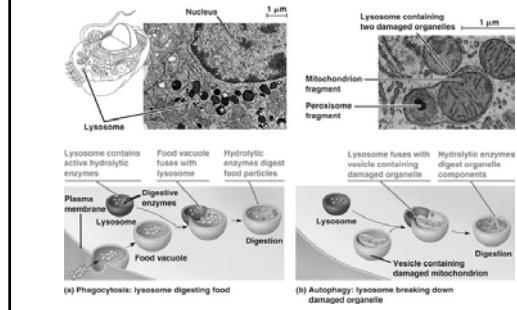
Golgi Bodies = “cell mailroom” = receive proteins and other materials from the ER – repackage and distribute to other parts of the cell



Chloroplasts = only in plants – green usually – capture the energy from the sun and turn into food for cell

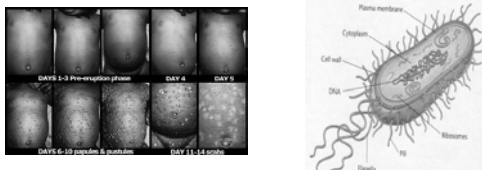


Lysosomes = round structures that contain chemicals to break down large food particles into smaller ones – also break down old cell parts (clean up crew)



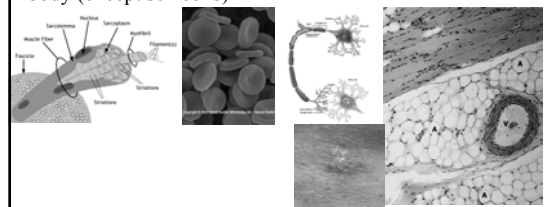
Bacteria Cells

- different than plant or animal cells
- usually smaller
- Have a cell wall and cell membrane but no nucleus
- Genetic material is found in the cytoplasm
- Do have ribosomes but not any other organelles



Specialized Cells

- plants and animals contain many cells
- Many cells different from one another in size and structure depending on their function
- All of your cells contain all of your DNA for your entire body (except sex cells)

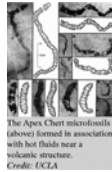


Earth's Early Atmosphere

- Nitrogen, carbon dioxide, methane were the most abundant gases in the atmosphere 3.6 billion years ago
- Today the major gases are Nitrogen and Oxygen

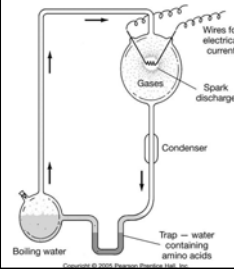
First Organisms

- did not breath oxygen
- unicellular
- lived in extreme environmental conditions



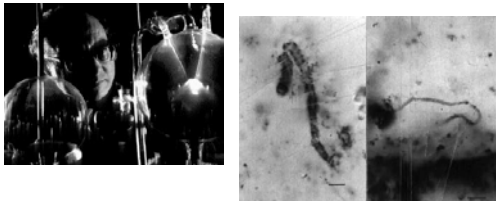
Life's Chemicals

- Harold Urey and Stanley Miller made an experiment – took water and the gases of the early environment and placed an electric current through it – this formed organic chemicals = building blocks of life



Scientists hypothesize that the small chemical units of life formed gradually over millions of years in Earth's waters – over time they joined together

Fossil record shows traces of these ancient organisms – these early cells show up about 3.4 to 3.5 billion years ago



First cells used chemicals in their surroundings for food – as number of cells increased the food decreased = some began to make their own food = produced oxygen

We do not know how life exactly appeared on earth



Play the saved MPeg Rob!

