AP Bio 12 Prezi Notes: Cells #1 Most Ex-cell-ant Student:

**Big Questions**

1. Why does life require cells?
2. How are cells organized?
3. What is the advantage to having organelles?
4. How do the interactions of cellular components allow for life processes?

**Dead White Men Who Discovered (and were made of) Cells**

Discovery of Cells (1600's): These are not the only 2 contributions

1. Anton van Leeuwenhoek:

2. Robert Hooke:

Cytology:

Cell Theory:

**Cytology Techniques**  
1. Microscopy  
A) Light Microscopy:

Maximum Magnification:

Maximum Resolution:

Types of light microscopy:

B) Electron Microscopy:

Maximum Magnification:

Maximum Resolution:  
Types of electron microscopy:

What are the benefits & problems of the 2 different kinds of microscopy?

2. Cell Fractionation: A way to isolate different components of cells for detailed study

4 Steps: - Collect tissue cell

- Homegenization (mix)

- Homegenate created

- Centrifugation

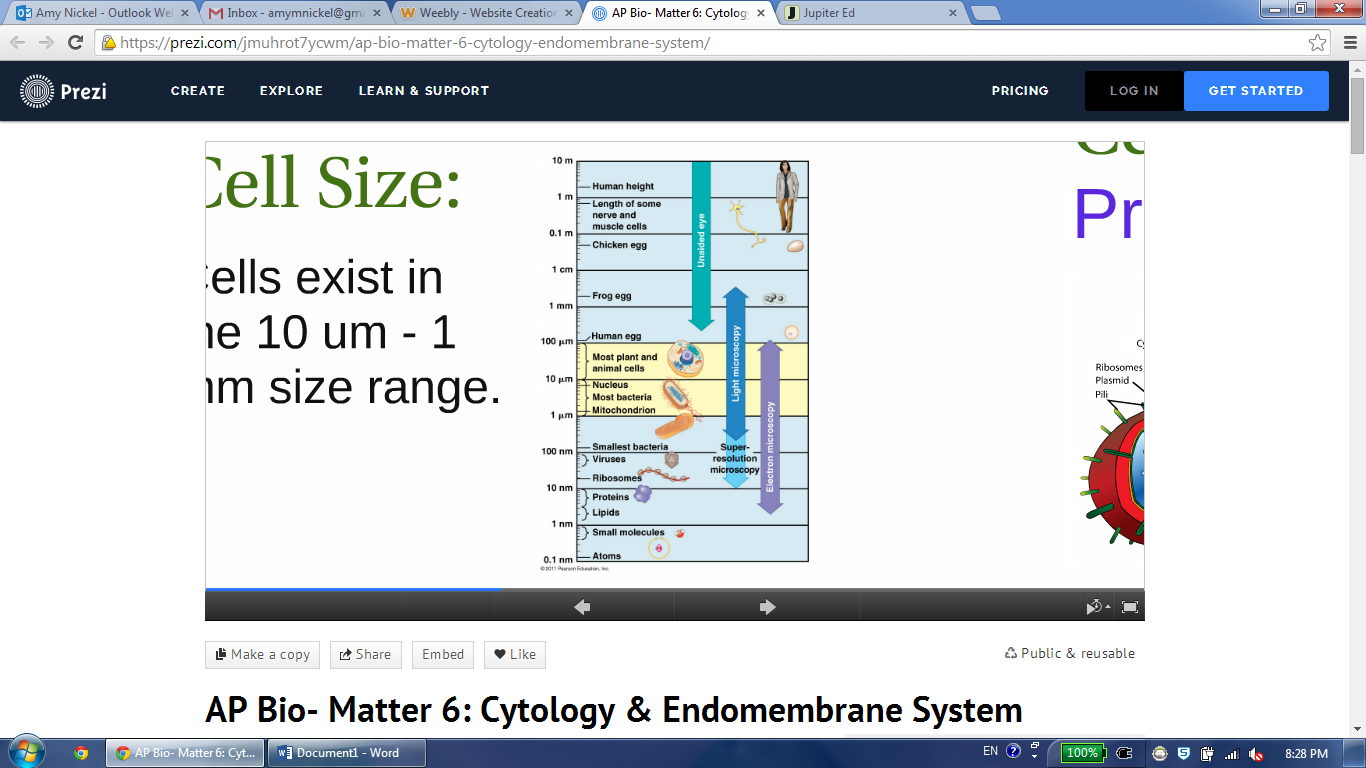
Material removed at each step of Differential Centrifugation:

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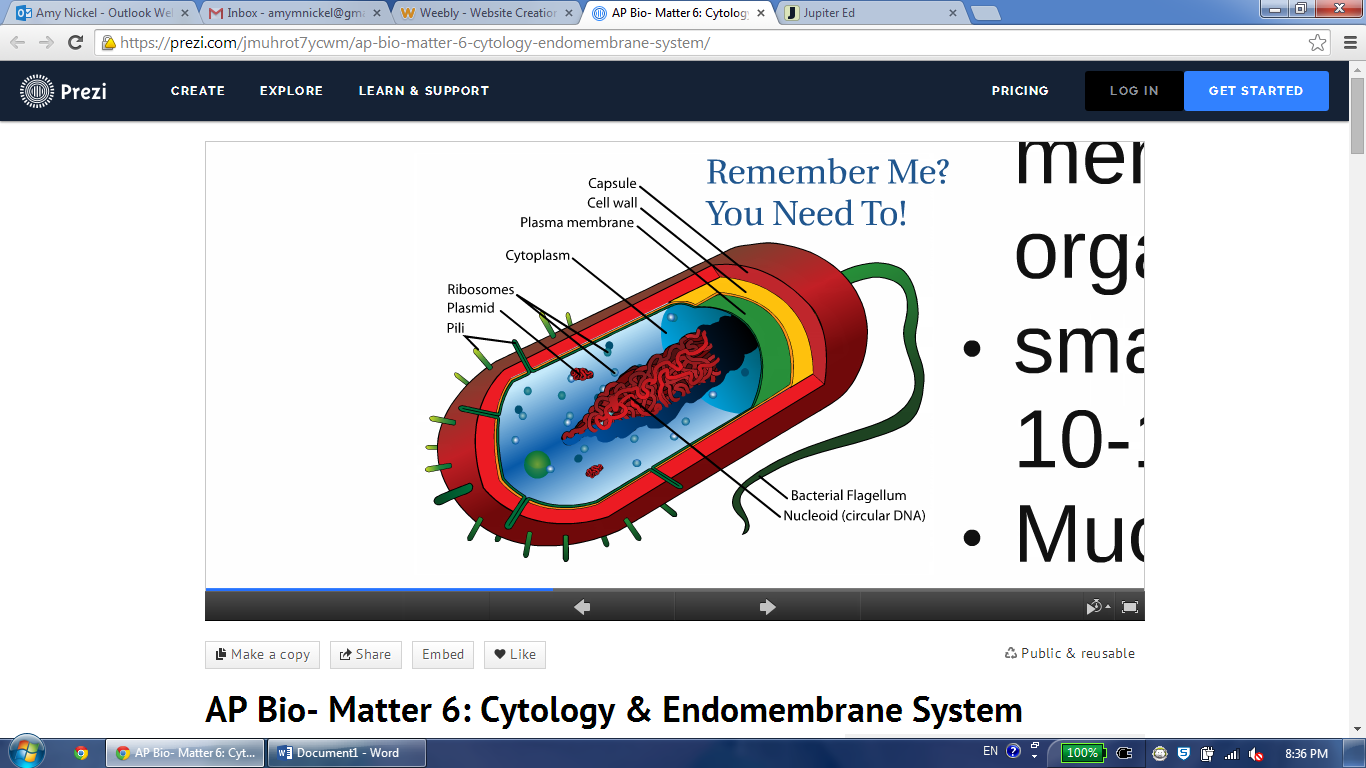
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**The Wide World of Cells:**

Cell Size:

Cells exist in the

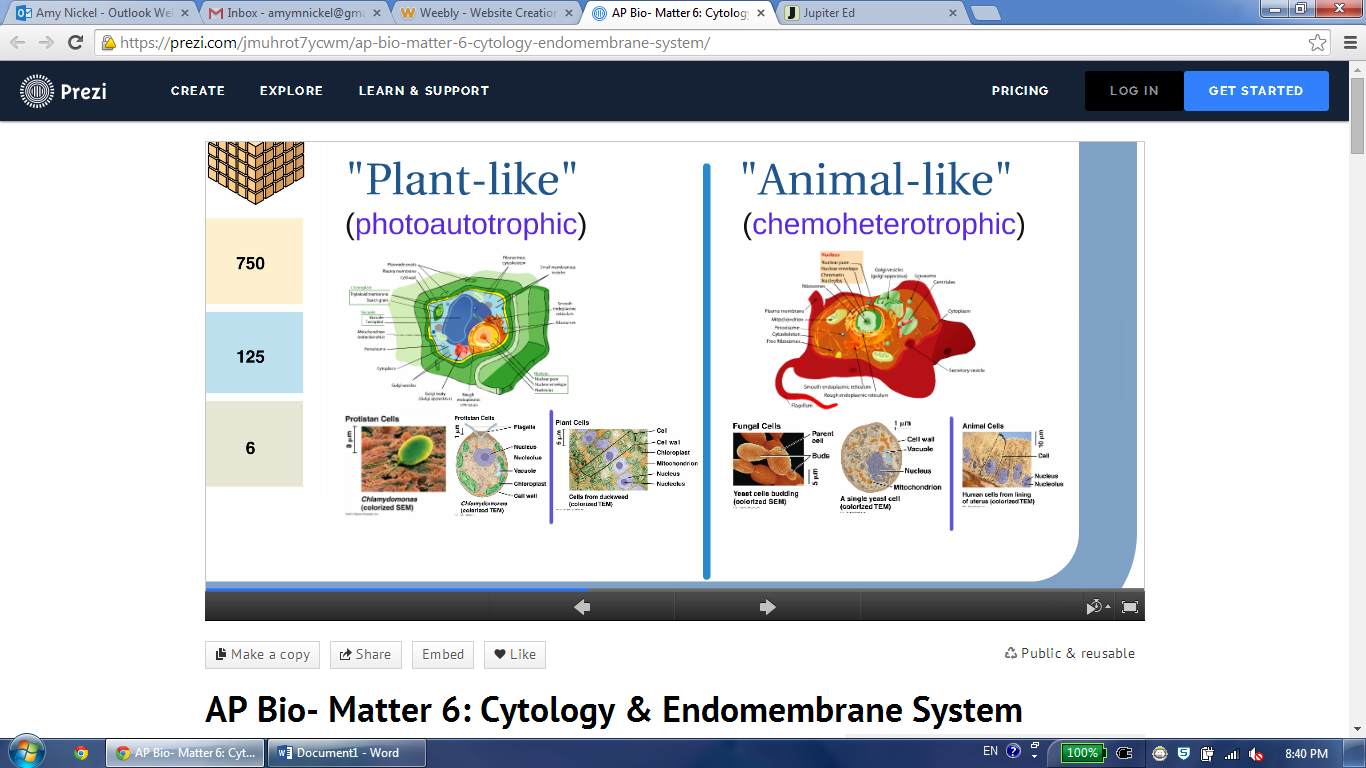
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_size range.



Cell Types:  
A) Prokaryotic

"simpler" (no \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_

organelles)  
smaller (typically \_\_\_\_\_\_\_\_\_\_\_\_)  
Much more abundant  
EX: \_\_\_\_\_\_\_\_\_\_\_\_\_\_



B) Eukaryotic  
lots of membrane bound organelles.  
larger (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)  
2 major types  
- "Plant-like" (photoautotrophic)

- "Animal-like" (chemoheterotrophic)

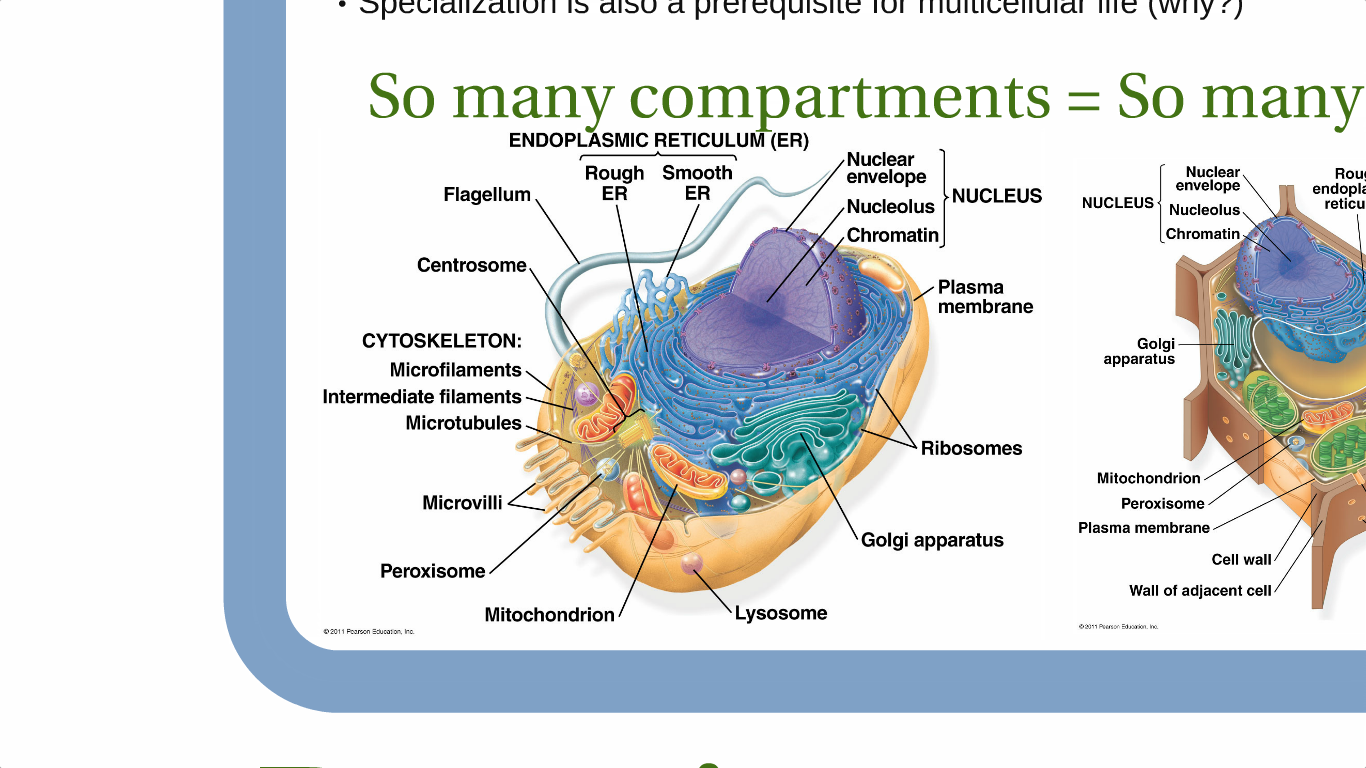
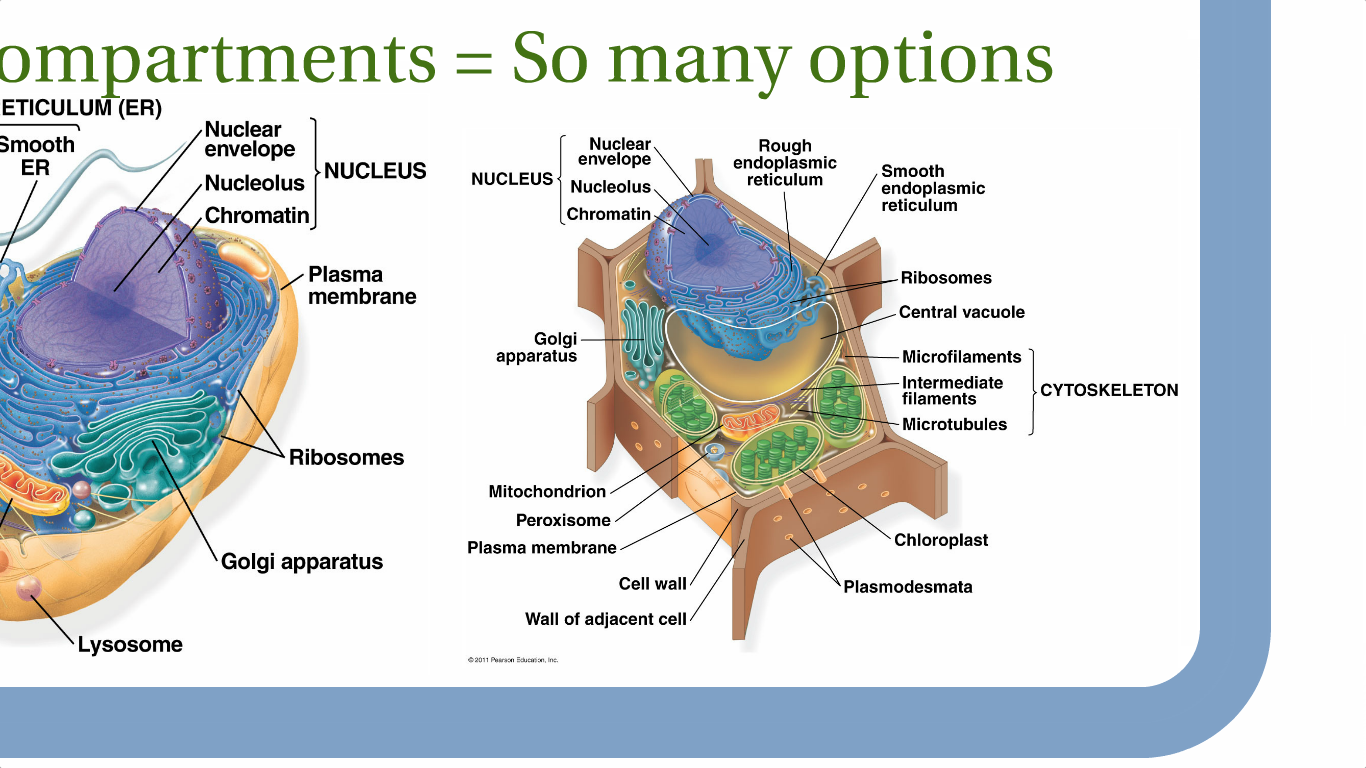
**The Utility of Membrane-Bound Organelles**  
Why organelles?

1. By enclosing parts of the cell in membrane, eukaryotic cells are able to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!

2. Membranes isolate different areas of the cell, which allows the cell to have varied conditions in

different regions (different \_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of different molecules, etc.)

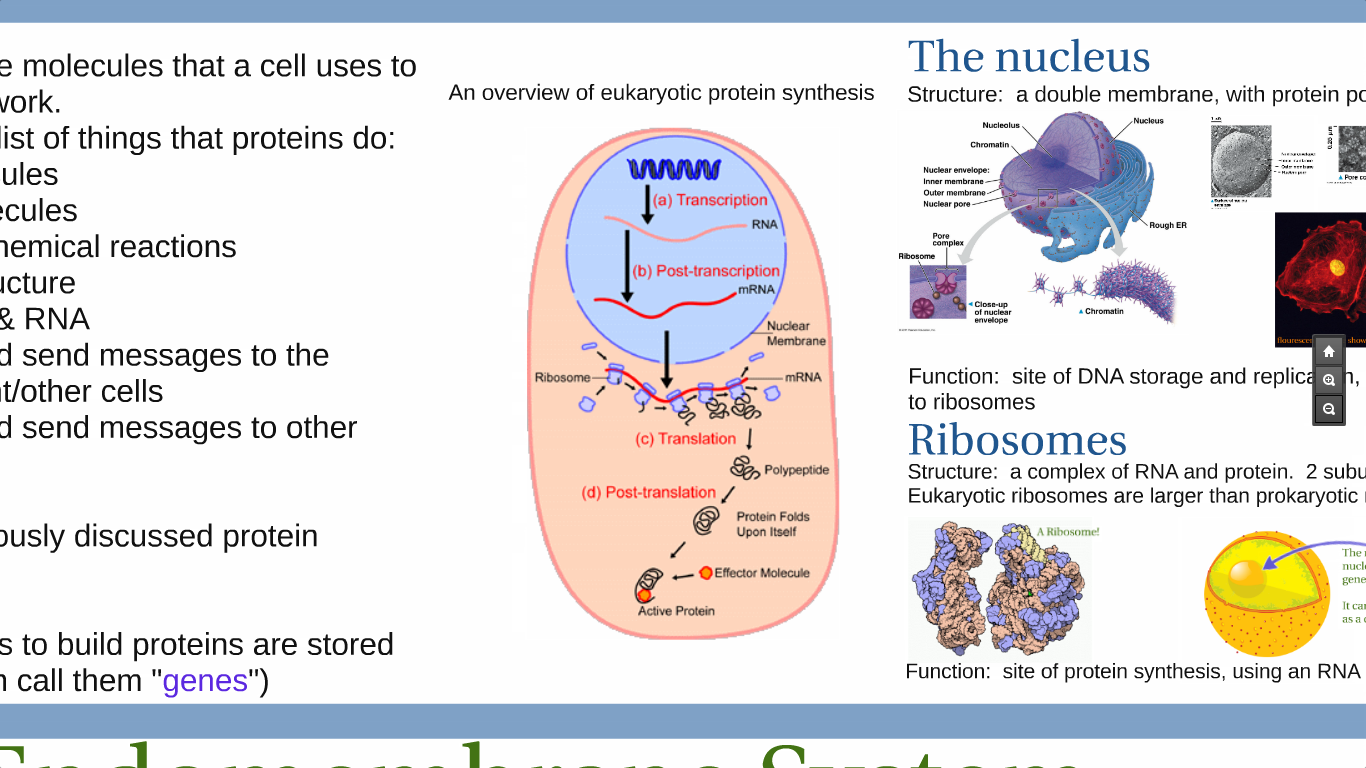
1. Membranes also provide \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for various reactions (Respiration and Photosynthesis, for instance).
2. The specialization of cellular regions is what makes eukaryotic cells so much more \_\_\_\_\_\_\_\_\_\_\_\_ than prokaryotic cells.
3. Specialization is also a prerequisite for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ life (why?)

So many compartments = So many options

**The Life of the Cell**  
All cells must do the following things to stay alive:

1. Process\_\_\_\_\_\_\_\_\_\_: Molecules need to be acquired, synthesized and digested
2. Process \_\_\_\_\_\_\_\_\_\_: In order to process matter, energy must be provided. This energy usually comes from one of two places (where?)
3. Process \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: The instructions that enable the cell to process matter and energy must be interpreted by the cellular system. Signals from the environment must also be interpreted.

Many cells will also do the following:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: The information that runs the cell must be passed on to new generations of cells.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Cells respond to/direct other cells.

Cells have systems to do all of these things!

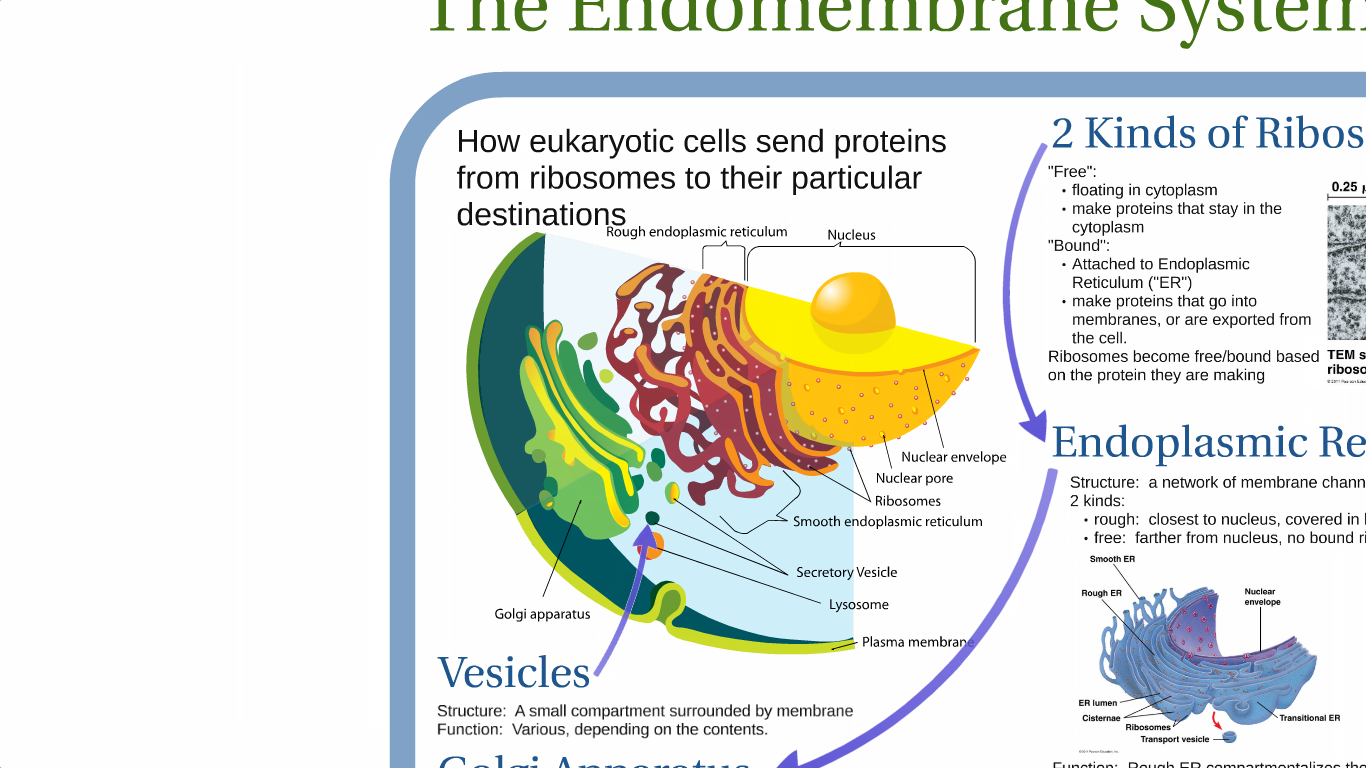
**Proteins**  
Proteins are the molecules that a cell uses to do most of its work.  
Here is a brief list of things that proteins do:

* \_\_\_\_\_\_\_\_\_\_ molecules
* \_\_\_\_\_\_\_\_\_\_ molecules
* Carry out \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_
* Provide \_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_ DNA & RNA
* Receive and send messages to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_/other cells
* Receive and send messages to \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_

We have previously discussed protein structure (primary, secondary, tertiary and quaternary)  
The instructions to build proteins are stored in DNA (genes)

The nucleus  
Structure: a double membrane, with protein pore channels  
Function:

Ribosomes  
Structure: a complex of RNA and protein. 2 subunits ("large" & "small"). Eukaryotic ribosomes are larger than prokaryotic ribosomes.  
Function:

The nucleolus is the region of the nucleus where ribosomal RNA genes are concentrated.  
  
**The Endomembrane System**

**2 Kinds of Ribosomes**  
1. "Free": floating in cytoplasm

- make proteins that stay in the cytoplasm

2. "Bound": Attached to Endoplasmic Reticulum ("ER")

- make proteins that go into membranes, or

are exported from the cell.

Ribosomes become free/bound based on the protein they are making

**Endoplasmic Reticulum**  
Structure: a network of membrane channels attached to the nuclear membrane.  
2 kinds:

1. rough: closest to nucleus, covered in bound ribosomes

function:

1. Smooth: farther from nucleus, no bound ribosomes

function:

**Vesicles**  
Structure: A small compartment surrounded by membrane  
Function:

**Golgi Apparatus**  
Structure: A series of flattened, membrane-bound sacs  
Function:

**Plasma Membrane**  
Structure: a phospholipid bilayer with embedded proteins.  
Function:

Make Sure You Can:

1. Explain the cell theory
2. Compare different types of microscopy.
3. Explain why there are no giant cells around.
4. Refine your contrast of prokaryotic and eukaryotic cells.
5. Relate the structure and function of the organelles in this presentation.
6. Explain the interactions of the organelles in this presentation.
7. Explain how the organelles in this presentation provide for essential life processes.