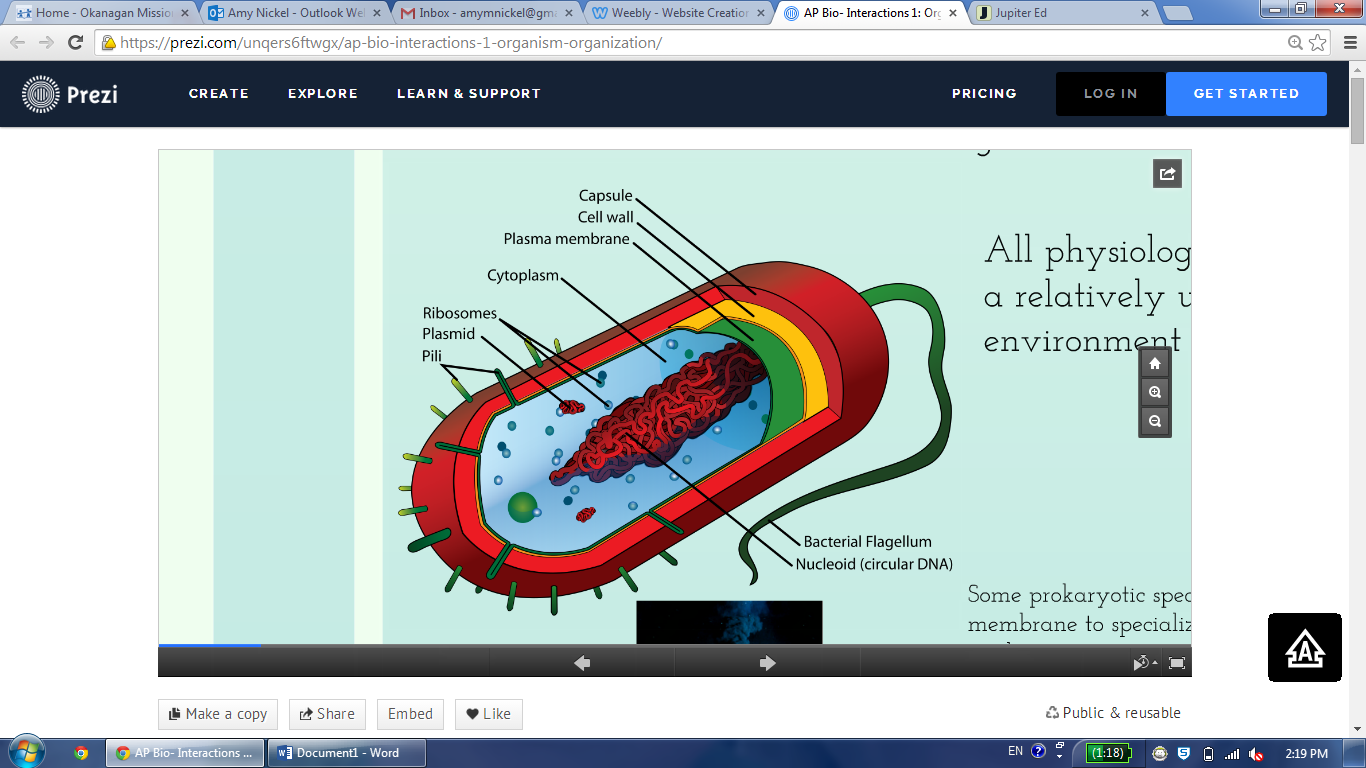
AP Bio 12 Prezi Notes #1: Organism Organization Original Organizer:

BIG QUESTIONS:

1. How are the structures of an organism related to their functions?
2. How is physiology accomplished across multiple levels of organization in an organism?
3. How does the environment constrain an organism's physiology?

UNICELLULAR:

All physiological processes occur at the cellular level of organization.

Unicellular organisms can interact with other organisms to increase their physiological efficiency, which is how we will usually encounter them in this unit

1. **Prokaryotic:** Prokaryotes are limited in physiological complexity due to the lack of membrane-bound organelles

Some prokaryotic species have modified the cell membrane to specialize in particular nutritional modes.  
All physiology has to occur in a relatively uniform cellular environment

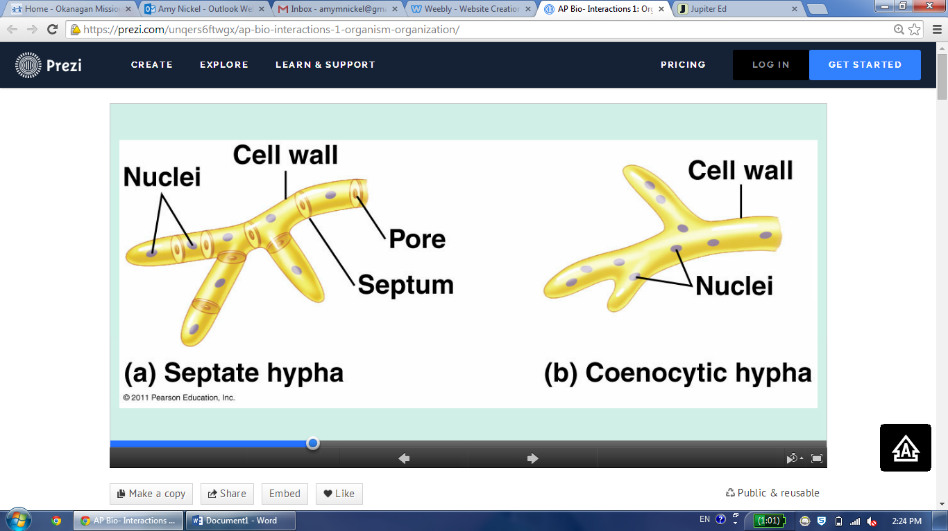
Some prokaryotes demonstrate physiological modes that are unique among organisms.



1. **Eukaryotic:** Unicellular eukaryotes are able to utilize membrane-bound organelles to compartmentalize the cell.  
   Compartmentalization allows for more regulation of cellular conditions and a wider diversity of physiological processes to occur in the cell.  
   Do not underestimate the impact of unicellular eukaryotes.

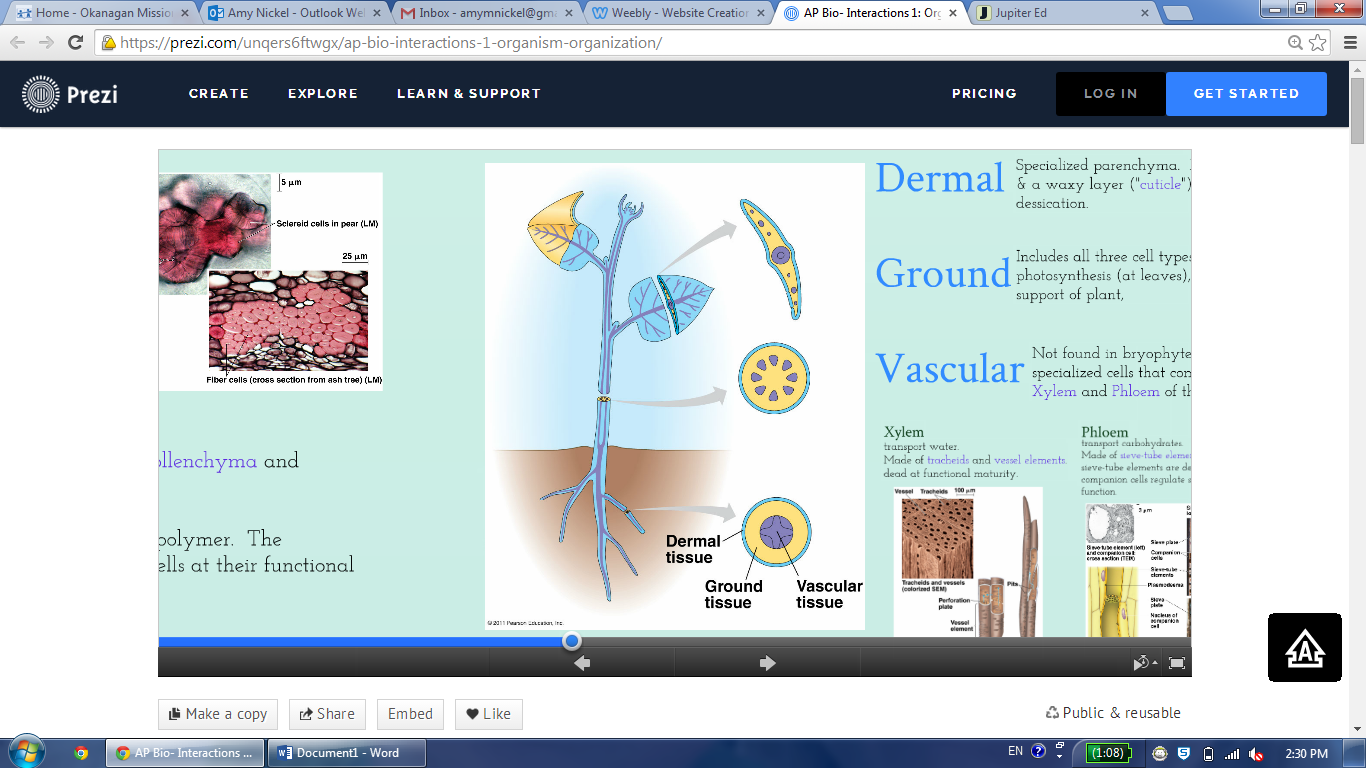
MULTICELLULAR:

1. Fungi: While fungi are multicellular, they have limited cellular differentiation.  
   Because of this, physiology remains largely a function of the cellular level of organization.

Diversity of fungal mycellial hyphae:   
**Septate:** Cells are separated by cell wall compartment ("septa")   
**Coenocytic:** Cells are all fused together into a multi-nucleate structure

That's about as interesting as things get in fungi-land

We will mostly encounter them in their interactions with other organisms.

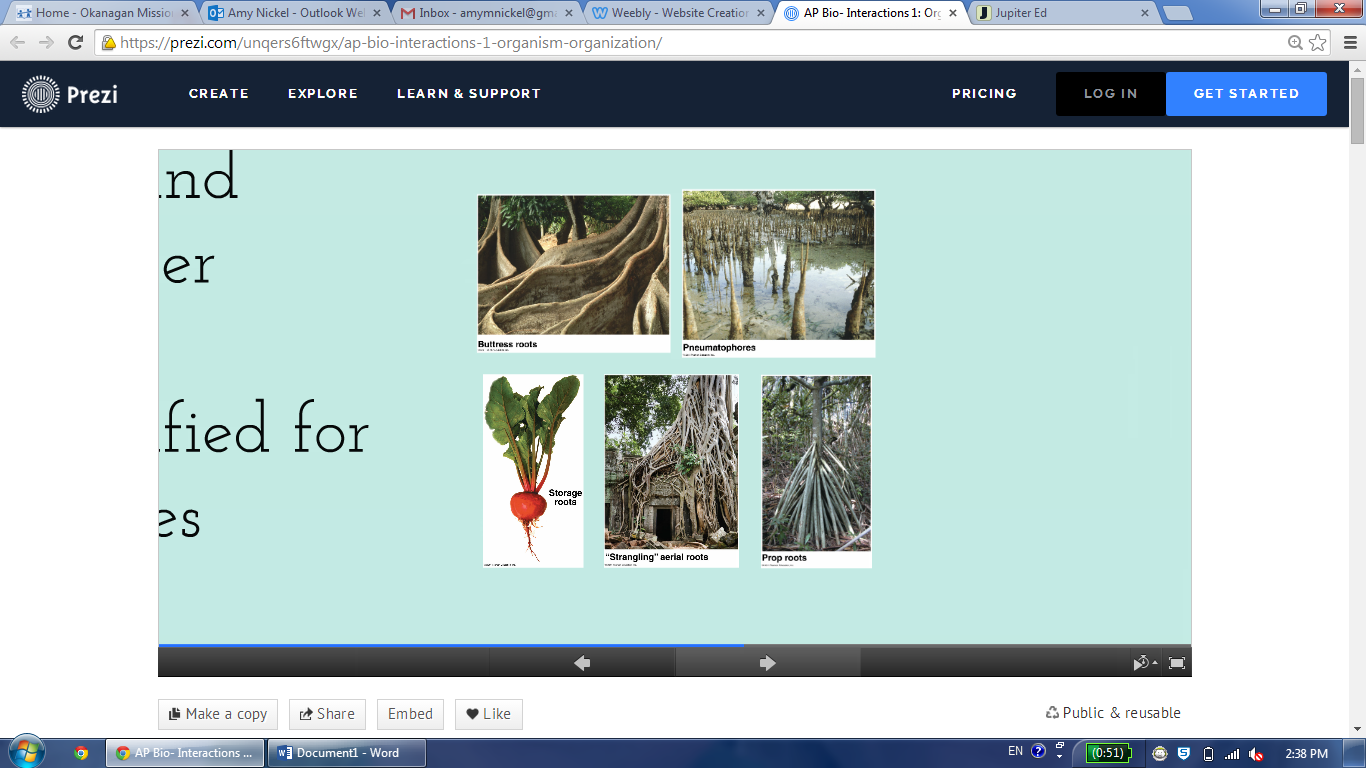
1. Plants: Plants demonstrate differentiation of cells.   
   Plant physiology can be understood in terms of tissue-level, organ-level, and even relatively simple systems-level  
   organization.
2. 3 Types of Plant Cells  
   Most of a plant's cells are parenchymal cells.  
   **Parenchymal** cells are responsible for photosynthesis, while **collenchyma** and**sclerenchyma** provide structure and support.   
   Schlerenchymal cell walls are filled with lignin, a structural polymer. The lignification process leads to the death of the sclerenchymal cells at their functional maturity.
3. 3 Types of Plant Tissues  
   **Dermal**: Specialized parenchyma. Includes stomates & a waxy layer ("cuticle") to prevent dessication.  
     
   **Ground:** Includes all three cell types. Involved in photosynthesis (at leaves), storage of food, support of plant,   
     
   **Vascular:** Not found in bryophytes. Contains specialized cells that comprise the Xylem and Phloem of the plant.

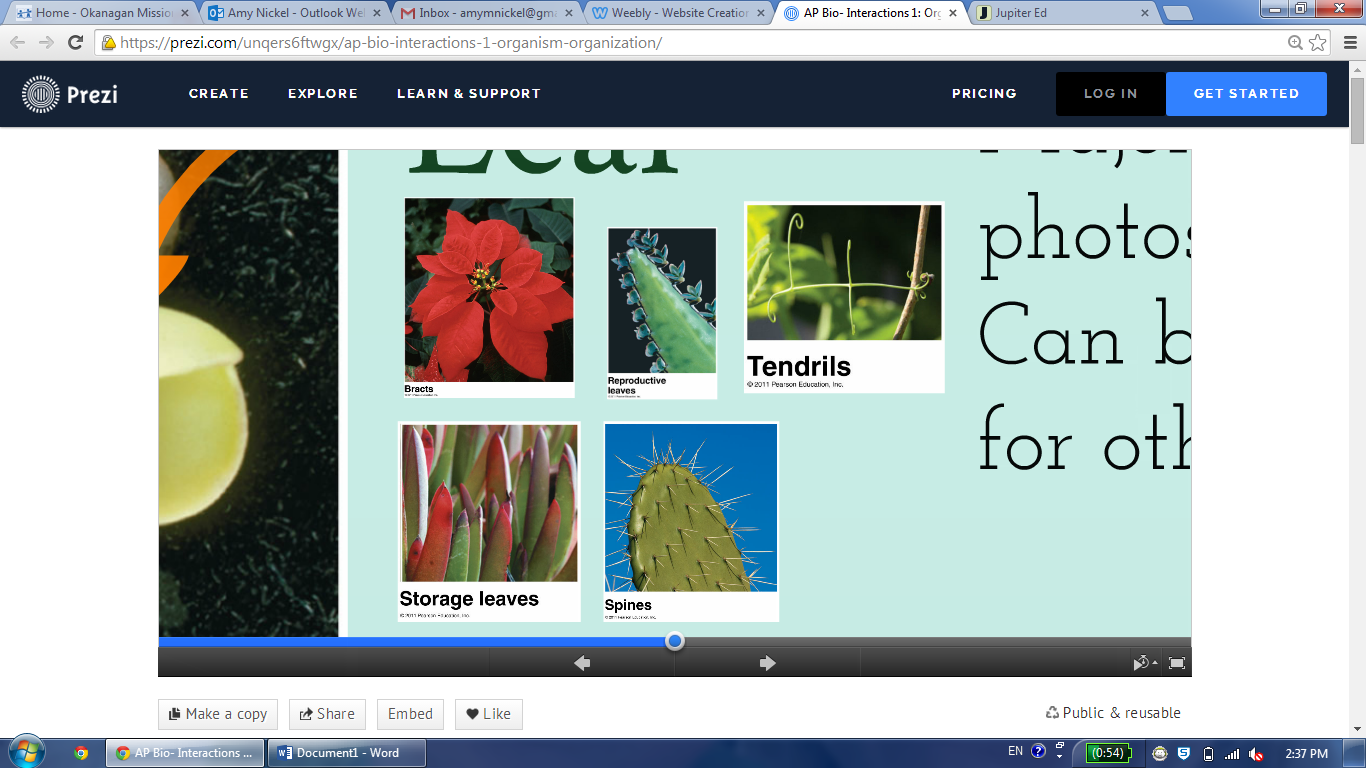
*Xylem:* transport water. Made of tracheids and vessel elements. Dead at functional maturity.  
*Phloem:* transport carbohydrates. Made of sieve-tube elements and companion cells. Sieve-tube elements are dead at functional maturity. Companion cells regulate sieve-tube element function.

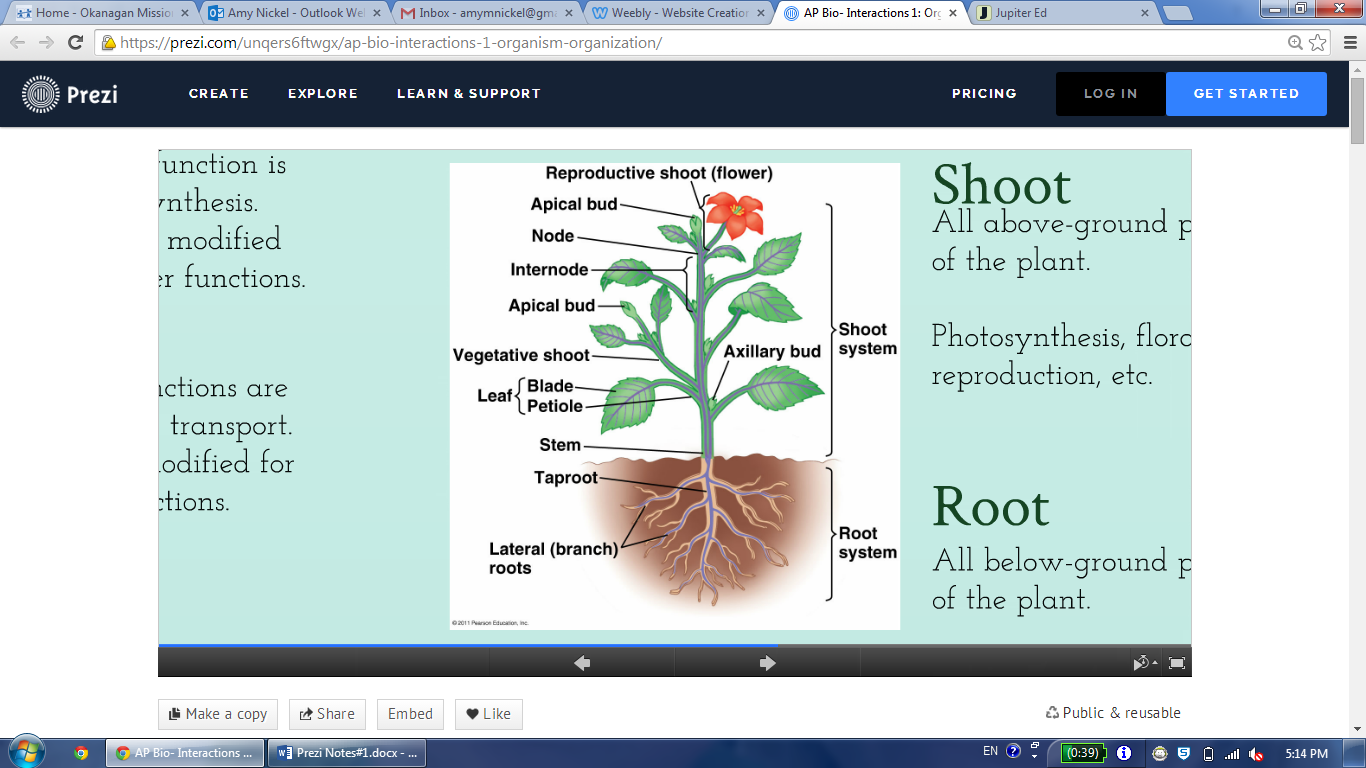
1. 3 Organs:

**Leaf:** Major function is photosynthesis. Can be modified for other functions.

**Stem:** Major functions are support & transport. Can be modified for other functions.

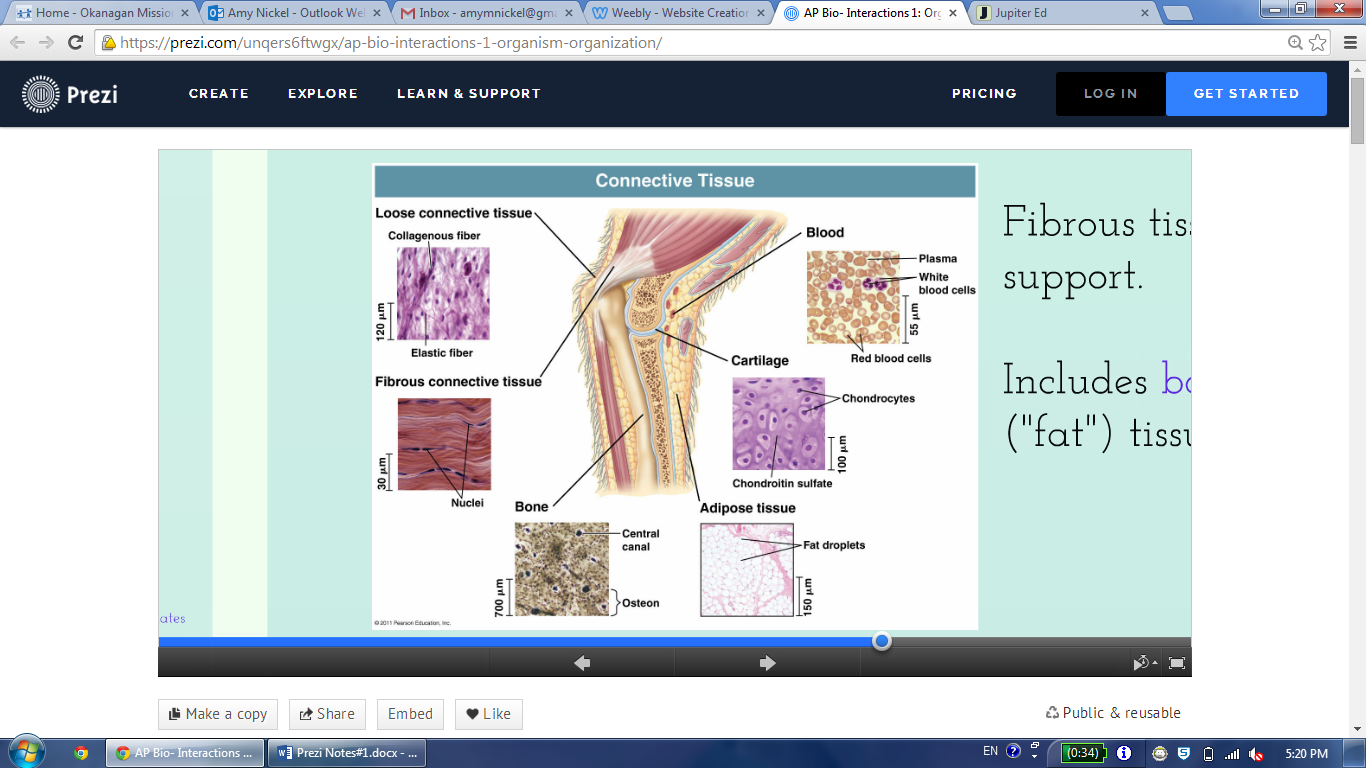
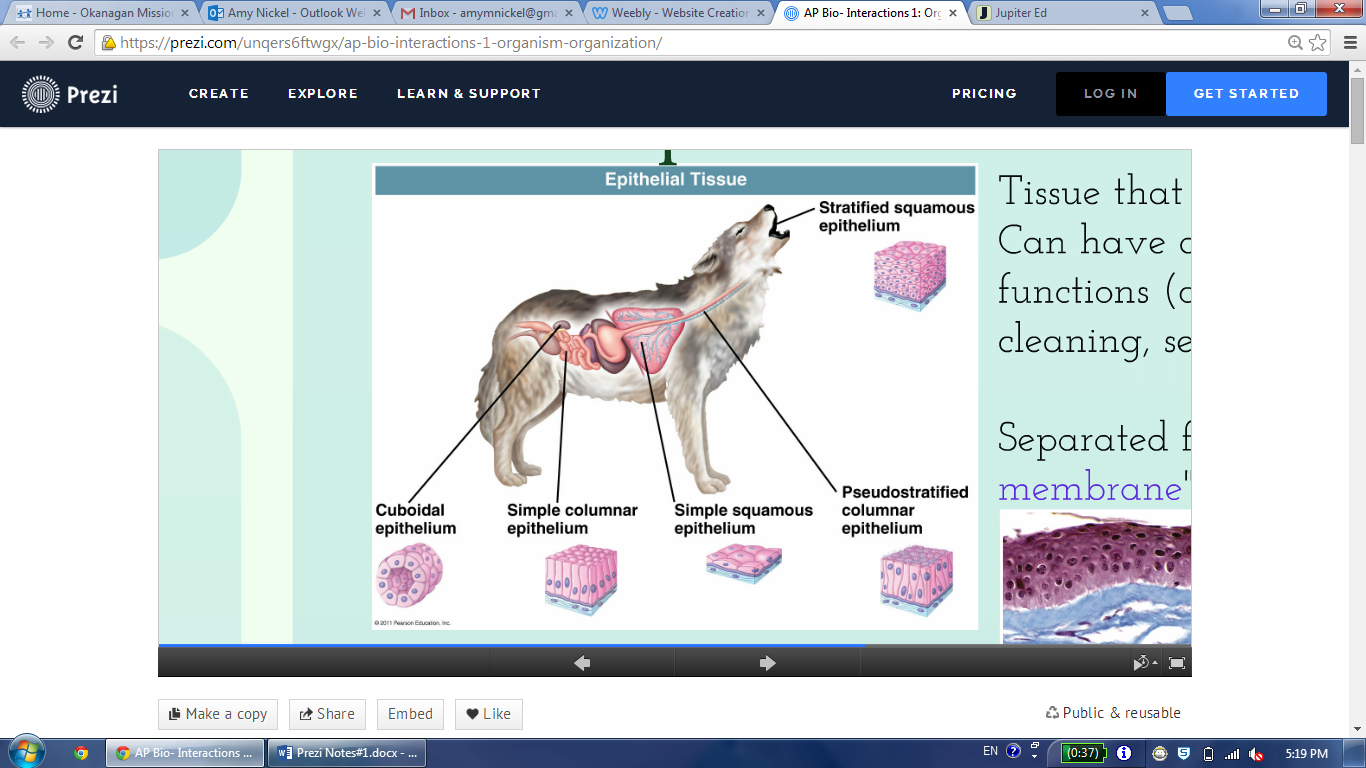
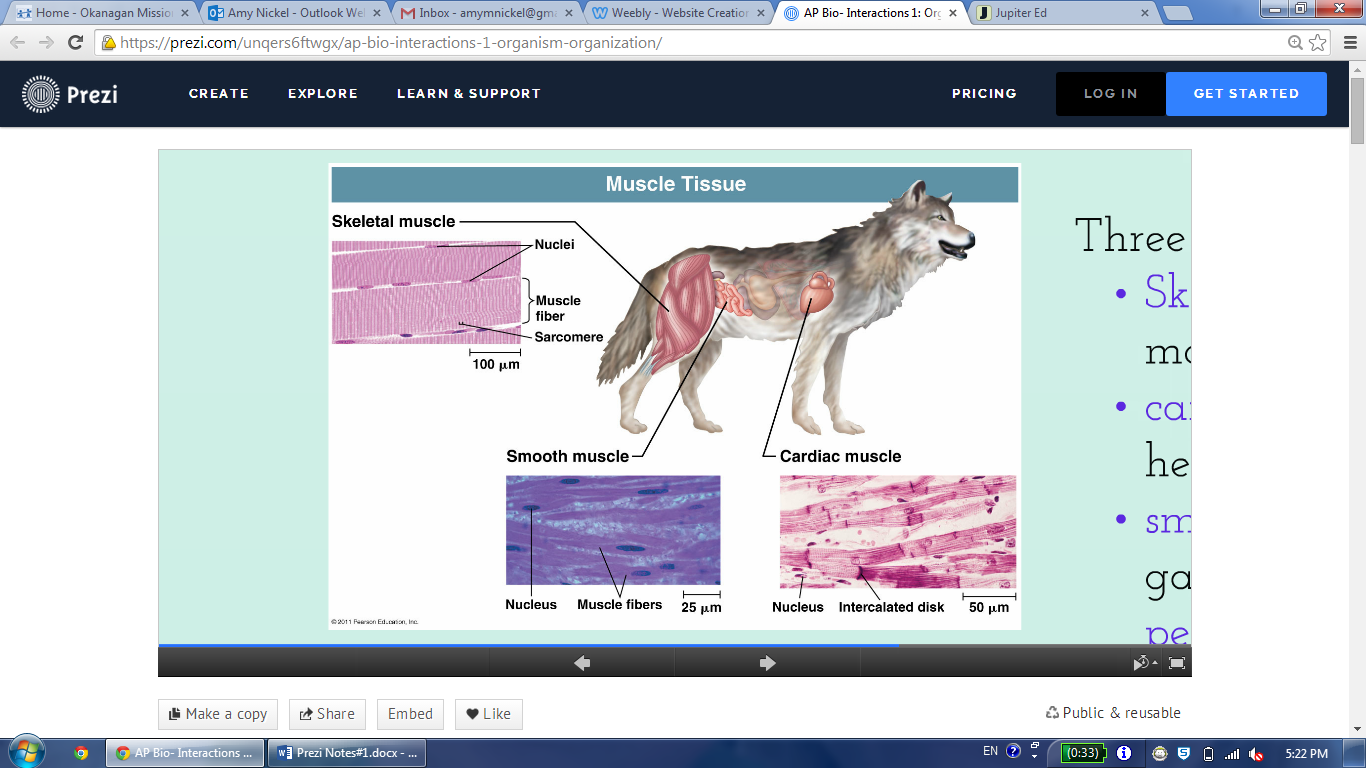
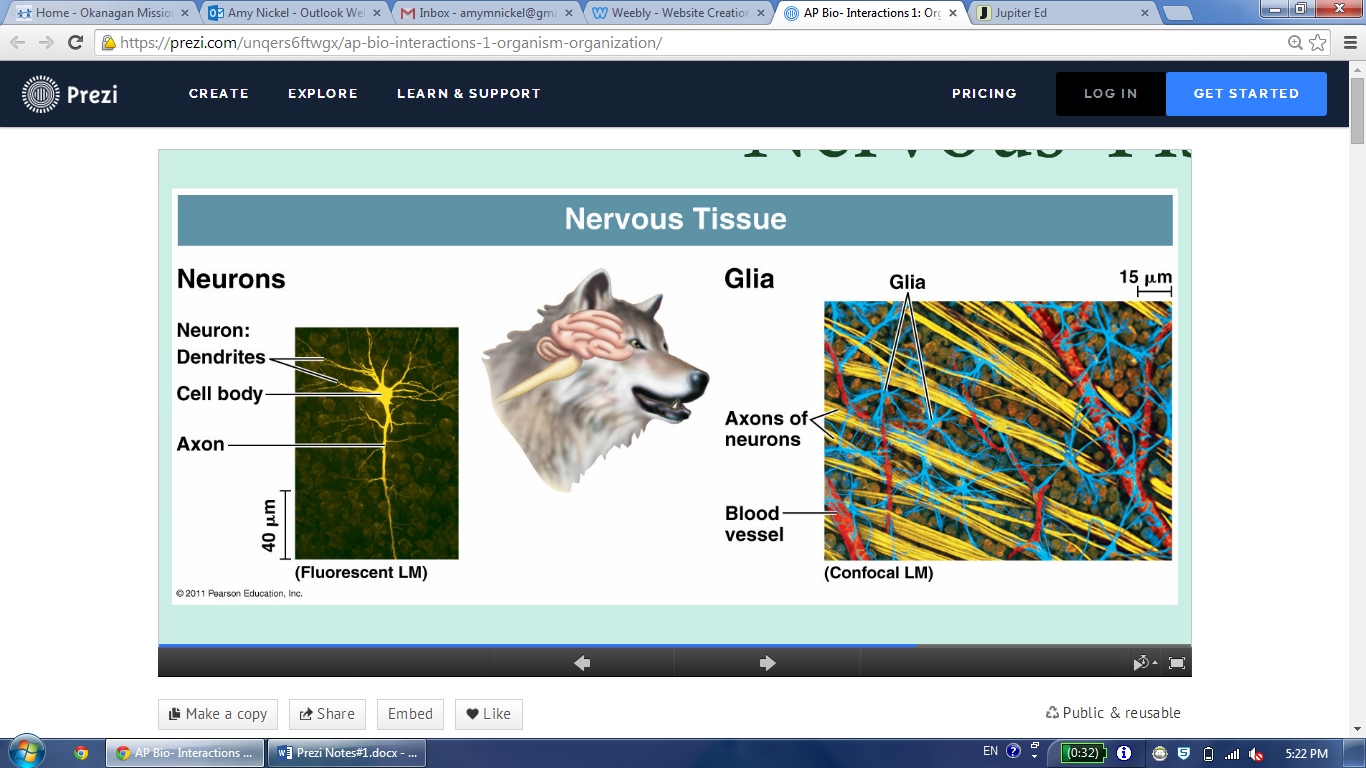
**Root:** Major functions are anchorage/water absorption. Can be modified for other purposes.





1. 2 Systems:

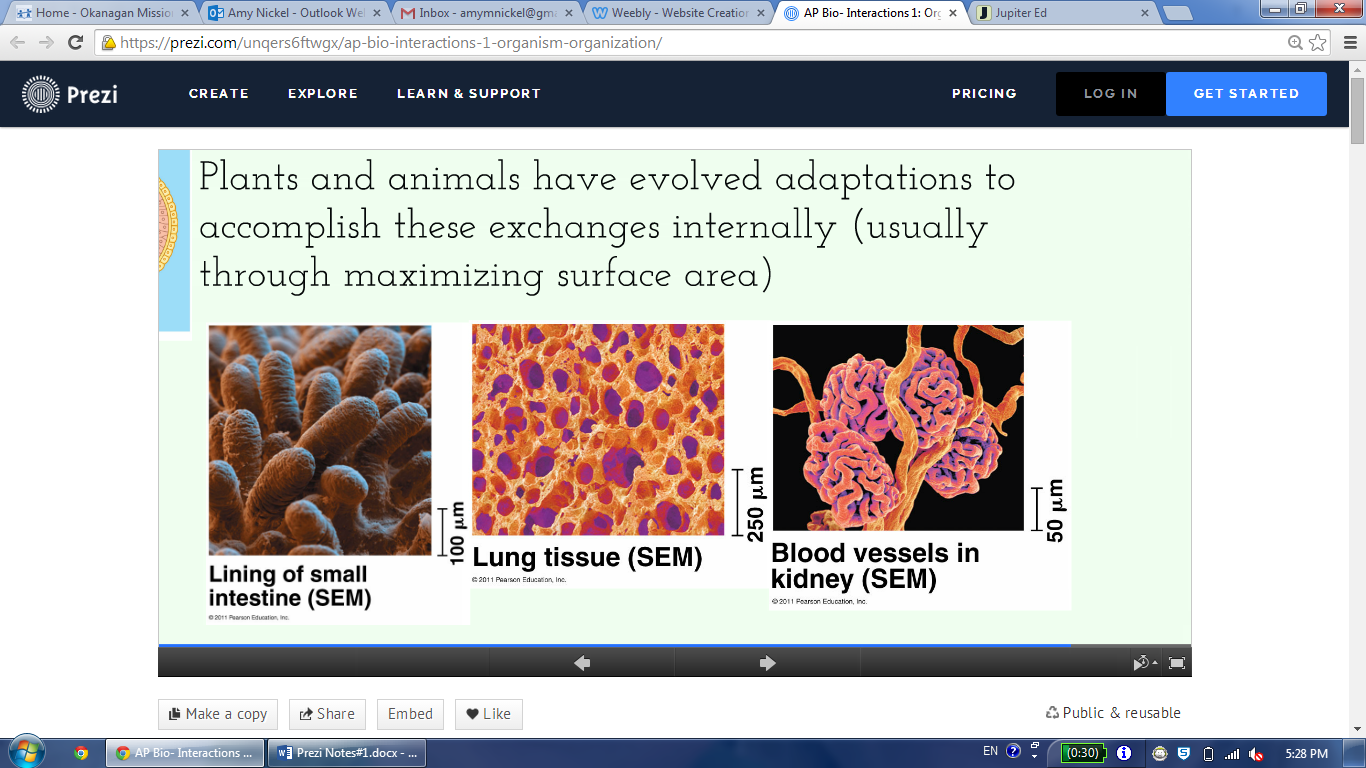
**Shoot:** All above-ground parts of the plant.  
Photosynthesis, floral reproduction, etc.  
**Root:** All below-ground parts of the plant.  
nutrient/water absorption, etc.

1. Animals: Animals generally demonstrate a greater degree of cellular differentiation than plants.  
   Because of this, animals demonstrate the greatest diversity of tissue-level, organ-level, and systems-level organization.
2. Cells & Tissues:
3. **Epithelial Tissues:** Tissue that lines the body.   
   Can have a wide variety of structures and functions (absorption, protection, sensation, cleaning, secretion, excretion, etc).  
   Separated from other tissues by a "basement membrane"
4. **Connective Tissues:** Fibrous tissue that provides structure and support.   
   Includes bone, cartilage, blood, adipose ("fat") tissue, ligaments and tendons
5. **Muscular Tissues:** Responsible for locomotion both internally and externally.  
   Three major types:   
   1. **Skeletal** ("striated") - includes all voluntary movement.   
   2. **Cardiac** - special muscle that comprises the heart.  
   3. **Smooth** - lines organs and the gastrointestinal tract, responsible for peristalsis.
6. **Nervous Tissues**: Responsible for coordination and control of the body.  
   Comprised of neurons and glial cells.
7. Organs & Systems: Animal tissues are arranged into organs.  
   These organs comprise organ-systems that allow for the animal to accomplish life functions.

**Homeostasis:** The internal, "steady-state" condition needed to remain alive. The nervous system monitors conditions and effects responses that maintain homeostasis through the functions of organ systems.  


ALWAYS:

The physiological processes at work in any organism are constrained by the environment and adapted by evolution.

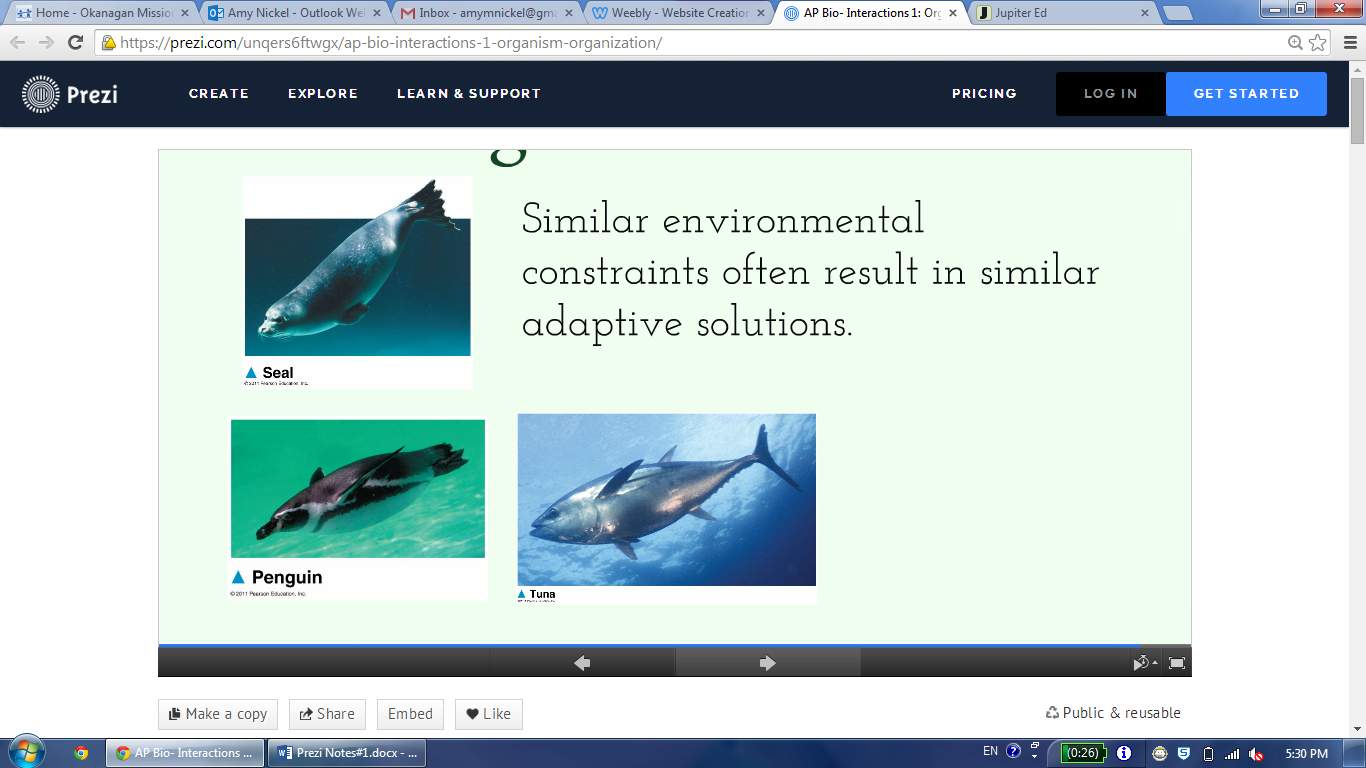
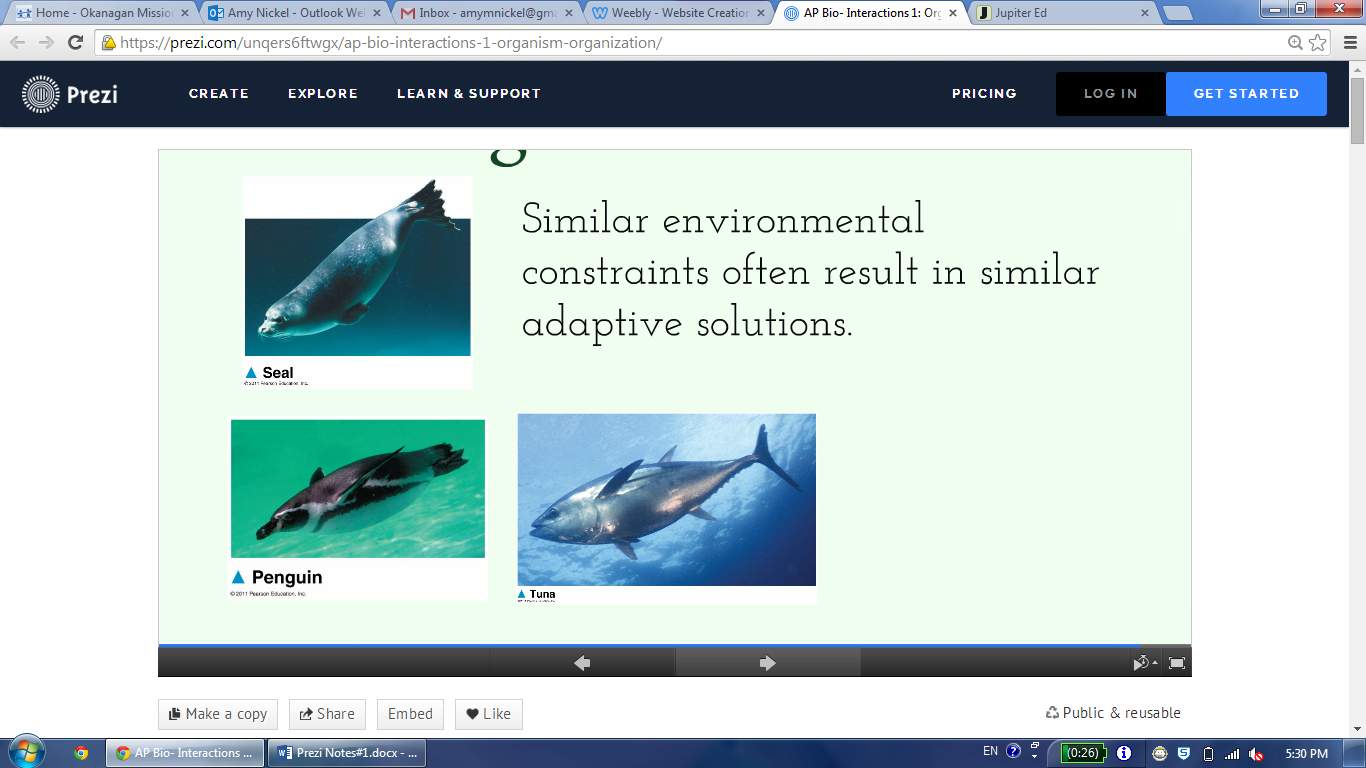


Example 1: Materials Exchange  
Unicellular and microscopic organisms are able to exchange materials directly with their environment  
Plants and animals have evolved adaptations to accomplish these exchanges internally (usually through maximizing surface area)



Example 2: Energy Considerations  
The energetic considerations of an organism's environment have consequences for physiology and behavior.

Example 3: Convergence  
Similar environmental constraints often result in similar adaptive solutions.



MAKE SURE YOU CAN:

1. Explain how multicellularity allows for increased levels of organization in an organism.
2. Identify the cells, tissues, organs, and systems present in plants and animals and explain their physiological functions, and their contributions to homeostasis.
3. Provide examples of how an organism's environment places constraints on its physiology.