• Exam #3
• Return at 7:20
• Chapter 18: Bacteria & Archaea
• Chapter 19: Protista
• Intro to Chapter 20: Plants

"Oh gawd - here comes Lenny with something he picked up off the toilet seat!"
Chapter 18: Bacteria & Archaea
Prokaryotes
2 Domains: Bacteria & Archaea

- Archaea share some traits with Bacteria, some with Eukarya, some unique
Archaea: Many are extremophiles

- Thermophiles

- Halophiles

- Methanogens
General Characteristics of Prokaryotes

• Small, single-celled
• VERY numerous – WHY?
• Cell wall with peptidoglycan (bacteria) or pseudopeptidoglycan (archaea)
Gram positive vs. Gram negative

- **Gram +**: Lots of peptidoglycan, no outer membrane, stain blue or purple
- **Gram -**: Less peptidoglycan, outer membrane, stain red or pink
Cell Surface: Stickiness

- Capsule
- Pili

Fig 18.5, pg 375
Directional Movement

- Flagella enables movement – many prokaryotes exhibit taxis
**Prokaryotic Cell Structure**

- Nucleoid region – area where DNA is found (single chromosome)
- Plasmids – smaller rings of DNA

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Fig 18.2, pg 373
Reproduction:

1. DNA is attached to cell membrane.
2. DNA replicates.
3. Newly synthesized DNA attaches to cell membrane.
4. Membrane growth between the two attachment points moves the DNA molecules apart.
5. New cell membrane and cell wall material is deposited between the DNA molecules.
6. The result of binary fission: two daughter cells, each identical to the original.

Fig 18.8, pg 379
Prokaryotic endospores enable survival in harsh conditions

Fig 18.6, pg 375
Nutritional Modes:
Source of Carbon & Source of Energy

- **Photoautotrophs**
  - **CO₂**: Light
  - **Organic Compounds**: Chemical

- **Photoheterotrophs**
  - **CO₂**: Chemical
  - **Organic Compounds**: Light

- **Chemoautotrophs**
  - **CO₂**: Chemical
  - **Organic Compounds**: Light

- **Chemoheterotrophs**
  - **CO₂**: Light
  - **Organic Compounds**: Chemical
How do bacteria affect our lives?

• Brainstorm: How many different ways can you think of that bacteria might affect our lives? (Good or bad!)
Chapter 19: Protista

The BORDERLINE

By Gabe Martin

Hey baby! Nice pseudopods!  Hubba, hubba!

Asexual Harassment
Protists: Mostly unicellular eukaryotes

Old classification system = Kingdom Protista
Now, much debate!

Animal-like protists (Heterotrophs)
Fungus-like protists (Absorptive)
Plant-like protists (Autotrophs)
Diplomonads: 2 equal-sized nuclei, multiple flagella, anaerobic

Giardia intestinalis: NOT a good camping buddy!
Alveolates have sacs beneath the plasma membrane called alveoli
Alveolates: Dinoflagellates

- Paired flagella in perpendicular grooves make the dinoflagellates spin
Dinoflagellates: Red Tides

Red tide off the coast of La Jolla
“Harmful Algal Blooms”
Bioluminescent Red Tides
Amoebozoans: Amoebas

- Move & feed using pseudopodia

Fig 19.13, pg 398
Amoebozoans: Plasmodial slime molds

- Form plasmodium (one big cell with many nuclei)
Amoebozoans: Cellular slime molds

- Solitary cells, can form aggregates
Stramenopiles: “Hairy” and smooth flagella
Stramenopiles: water molds, & downy mildews

A water mold breaking down a dead insect

Potato Late Blight: A downy mildew
Stramenopiles: Diatoms have test (skeleton) made of silica

Fig 19.5, pg 393
Stramenopiles: Brown algae

• Multicellular, mostly marine, ex: giant kelp
Red Algae

• Most widespread & abundant marine algae
Green Algae

- Most closely related to land plants
- Chlorophyll for photosynthesis
Green Algae Life Cycle

- Alternation of generations
- Gametophyte = haploid
- Sporophyte = diploid

Fig 19.8, pg 394
Chapter 20: Plants
Plants evolved from green algae

Plants moved to land approx. 500 MYA
Charophyceans: Closest relatives to land plants
Challenges of living on land

Desiccation; Obtaining water & nutrients; Reproduction
Benefits of living on land

Ample, unfiltered sunlight; Abundance of CO$_2$; Few herbivores & pathogens at first
Plants vs. Algae
(Adaptations to their environments)
Plants have Alternation of Generations

Fig 20.2, pg 411
Plant diversity reflects evolutionary history (adaptations to life on land!)

Fig 20.4, pg 412