GERM THEORY

Check out just how small...
• [http://learn.genetics.utah.edu/content/begin/cells/scale/](http://learn.genetics.utah.edu/content/begin/cells/scale/)
Recall - The First Microorganism Observations

- 1673-1723, Anton van Leeuwenhoek described live microorganisms that he observed in teeth scrapings, rain water, and peppercorn infusions.

Spontaneous Generation

- Hypothesis: Living organisms arise from nonliving matter.
- About 100 years ago it was believed toads, snakes, and mice could be born of moist soil, flies from manure, maggots from decay.
- Redi’s Experiment:
  - Predicted that keeping flies away from meat would prevent maggots
  - Found that covered jars did NOT have maggots
  - Evidence that meat doesn’t produce maggots.
The Theory of Biogenesis

- The alternative hypothesis: **living organisms arise from preexisting life**
- Pasteur’s S-shaped flask kept microbes out but let air in.

**Cell Theory!**

The Golden Age of Microbiology

- 1857-1914
- Beginning with Pasteur’s work, discoveries included the relationship between microbes and disease, immunity, and antimicrobial drugs

• Be sure to take notes on what you see!

**SHOW Video Clips**
Infectious Disease

• Where does disease come from?
  • Past
    • Curses, Evil Spirits, Bad smelling Vapors
  • Present
    • Inherited (hemophilia)
    • Environment (cigarette smoke)
    • Biotic Agents (Bacteria, Viruses, Fungi, Protist)

Pathogen – disease causing agents. “sickness-makers”

How Do We Know What is Making Us Sick?
Robert Koch described the steps of infectious disease in 1876 after the work of many other scientists when he used them to prove that *Bacillus anthracis* was the cause of anthrax.

**Koch’s Postulates**

1. **Isolate the organism** from every case
2. **Grow in culture**
3. Reproduce disease by injecting the organism into a suitable recipient
4. **Re-isolate the organism**
During the past century, Koch Postulates have been used successfully many times. Koch himself discovered the cause of Tuberculosis.

- Louis Pasteur
  - Rabies
  - Anthrax
  - Chicken Cholera

- Edward Jenner
  - Small Pox

- Allen Steere
  - Lyme Disease

How Disease is Spread

1. Person to Person
   - Coughing, Sneezing, Physical Touch
   - Ex. Common Cold, Mumps, measles
   - Prevention:
     - Covering your mouth when you cough
     - Washing your hands
Sexually Transmitted Diseases

- Some of the most dangerous pathogens are spread person to person by sexual contact
- Infect MILLIONS – Kills THOUSANDS each year in the USA alone
- **Bacteria** – Syphilis (can be fatal), Gonorrhea and Chlamydia (damage reproduction ability)
- **Viruses** – Hepatitis B and C, Genital Herpes, AIDS (Fatal)

How Disease is Spread

2. Contaminated Food/Water

- **Prevention:**
  - Proper cooking of meats
  - Hand washing of food workers
  - Sanitation of water
How Disease is Spread

3. Infected Animals
   • **Vectors** - animals that carry disease-causing organisms from person to person
   • **Ticks (Lyme), Mosquito (malaria, West Nile)**
   • Prevention:
     • Limit Exposure – avoid tall grass (protective/tight clothing)
     • Spraying insecticides

Fighting Infectious Disease

• **Treatment**
  • Antibiotics – kill bacteria without harming the cells of humans or animals
• **First Discovered:**
  • *Penicillium* – interferes with the synthesis of bacterial cell walls
Vocabulary Review

- Spontaneous Generation
- Biogenesis
- Robert Koch
- Louis Pasteur
- Redi
- Vector
- Pathogen
- Antibiotic

Can you describe these to your partner?