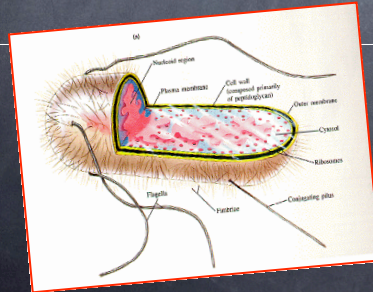


Bacteria and Viruses

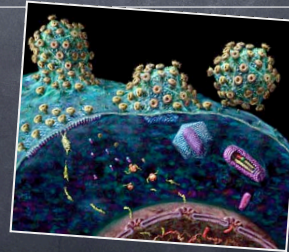
Bacteria

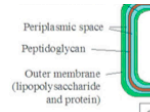
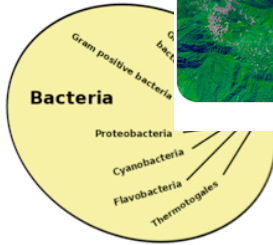
- Living
- One-Cellled, small, no nucleus, DNA
- Obtain energy, move, reproduce by dividing



Viruses

- Non-living? Need host cell to "reproduce"
- Protein coat with DNA or RNA
- Very small, can infect bacteria!





Acidophiles "love" acid. They live in very acidic environments, such as acid mine drainage. Some can even survive in environments with negative pH values. Many are also hyperthermophilic.



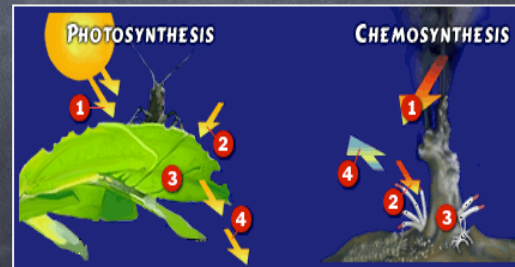
FIGURE 13.2

Cyanobacteria Bloom. The green streaks in this lake consist of trillions of cyanobacteria. Excessive nutrients in the water led to overgrowth of the bacteria.

- AEROBIC
- ANAEROBIC

Bacteria

- Unicellular
- Prokaryotes: no nucleus/organelles
- Photosynthesis, Chemosynthesis or Heterotroph



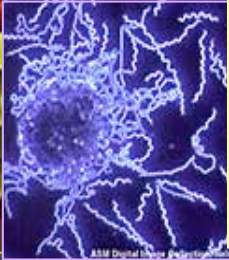
salmonella eats meat, poultry

Shapes

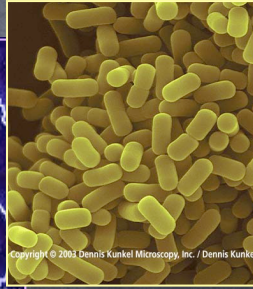
Cocci – Round
Shaped

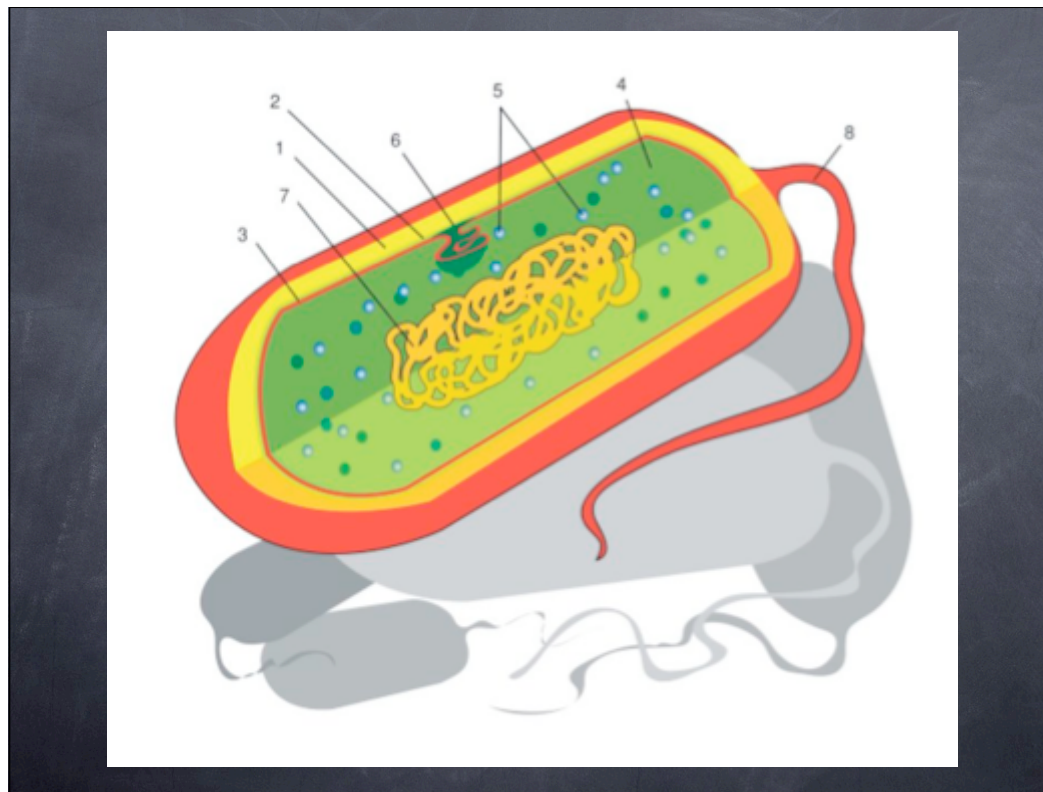


Spirilla – Spiral
Shaped (helix)



Bacilli – Rod
Shaped





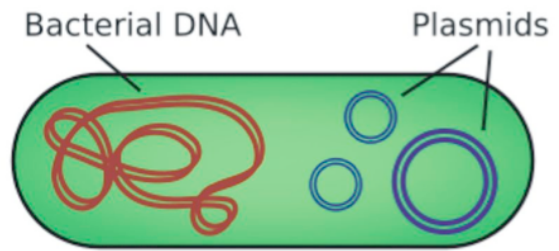
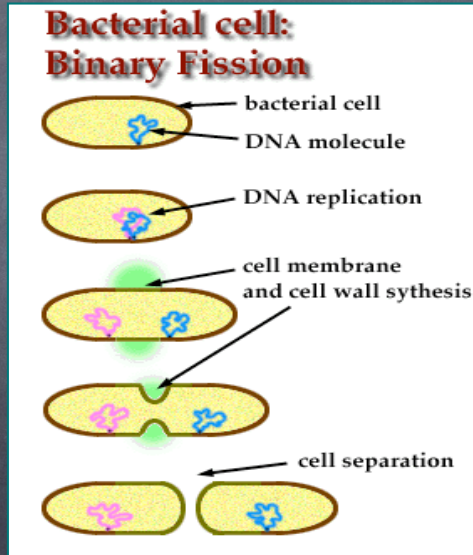


FIGURE 13.7

Prokaryotic DNA. The DNA of a prokaryotic cell is in the cytoplasm because the cell lacks a nucleus.

Reproduction

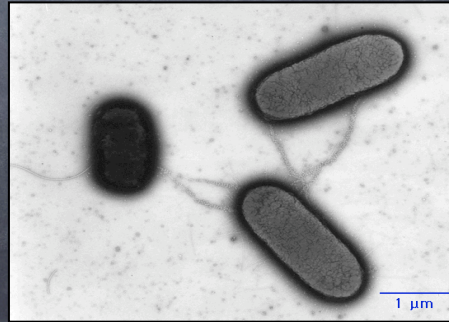
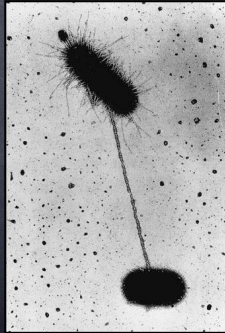
- Binary Fission
- copies DNA, then divides



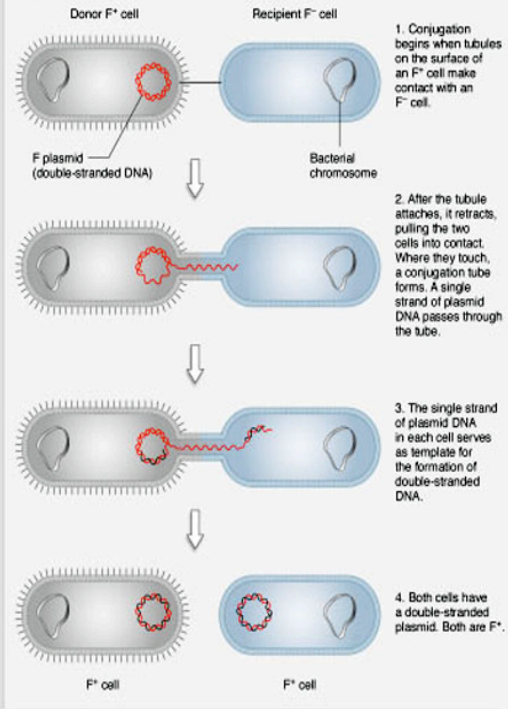
2. Rapid Reproduction – Use a process called binary fission
 3. One cell splits in half to form two cells
 3. DNA is copied very quickly without a “spellcheck”
4. Bacteria have many mutations in their DNA
some reproduce every 20 mins

Conjugation (Bacteria Sex)

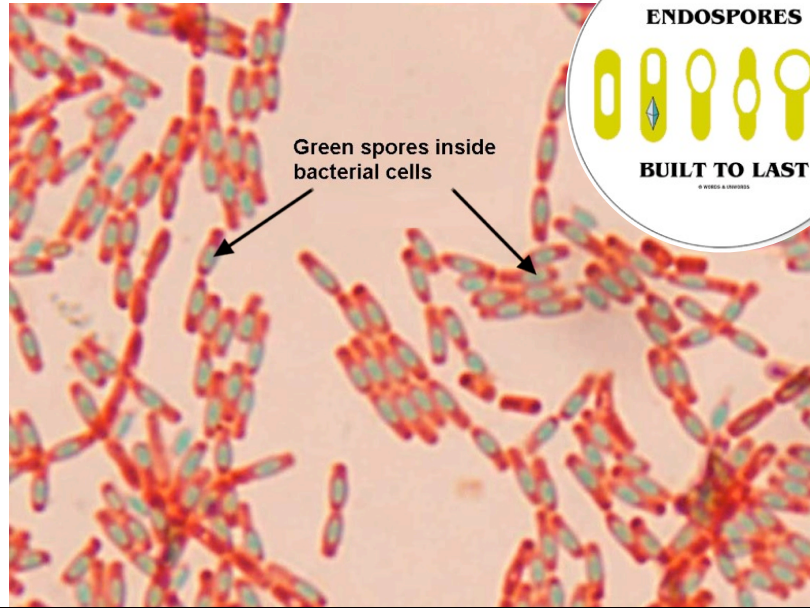
- Bacteria trade DNA with each other (can pass on new traits like resistance to antibiotics)



CONJUGATION

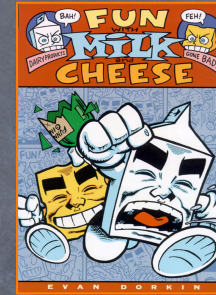
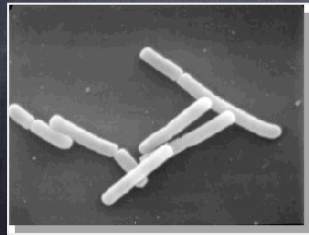


endospores



Bacteria can be Helpful!

- Make foods like yogurt, cheese, sour cream, sourdough bread
- Help digest food - E.Coli
- Recycle Nutrients



Bacteria can be Harmful!

- Diseases: Anthrax, Botulism, E. Coli, Strep Throat, Pneumonia, Salmonella, TB, Bubonic Plague, Flesh-eating Bacteria,

• Spread through Vectors

Tick: Vector for Lyme Disease



Deerfly: Vector for Tularemia



FIGURE 13.12

Bacterial Disease Vectors. Ticks spread bacteria that cause Lyme disease. Deerflies spread bacteria that cause tularemia.

Bacteria in the news

- <http://www.doctorswithoutborders.org/news/article.cfm?id=4866&cat=video&ref=related-sidebar>

Bacteria in the news

- <http://www.youtube.com/watch?v=SxEvOCIROGo>

Treatment for Bacterial Diseases

- Antibiotics which interfere with the membrane production

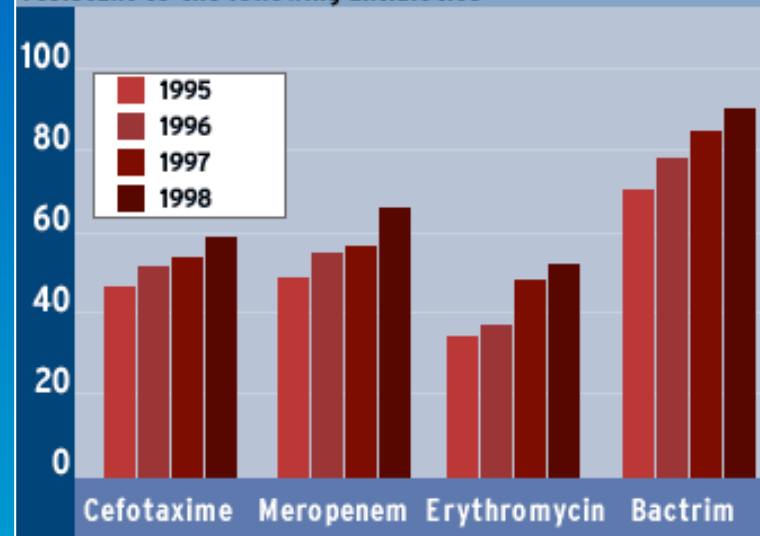




Bacteria can evolve to be resistant due to overuse of antibiotics on food crops, prescribed for viral diseases, in soap

Dangerous Bacteria

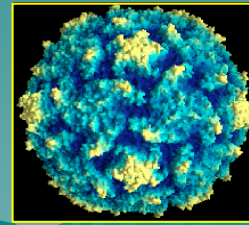
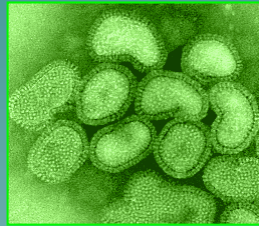
Percentage of streptococcus pneumonia resistant to the following antibiotics

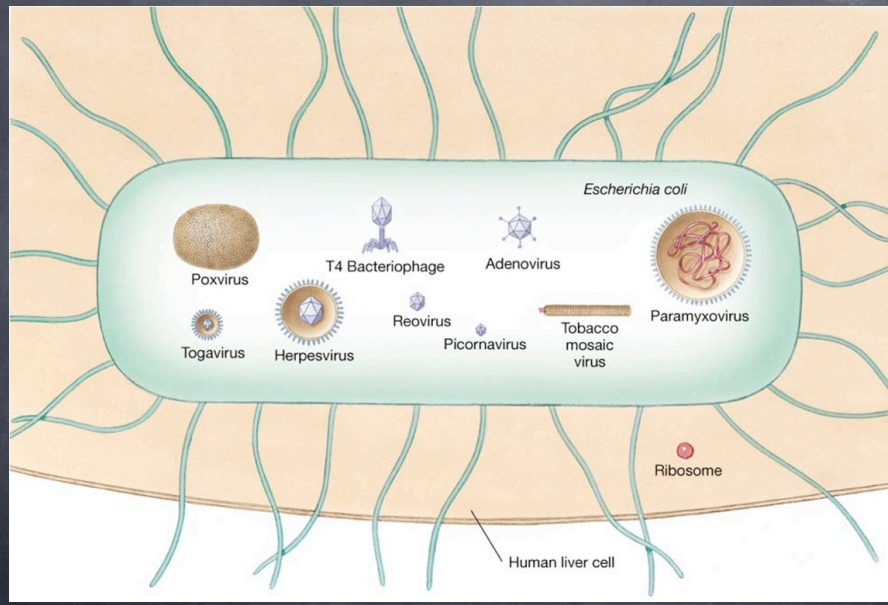


Details cont.

2. Antibiotics can only be used to kill living things
3. Cannot treat viruses like the cold or flu
4. Viruses do not have the cell parts that are targeted by antibiotics

SO, WHAT DO VIRUSES HAVE?

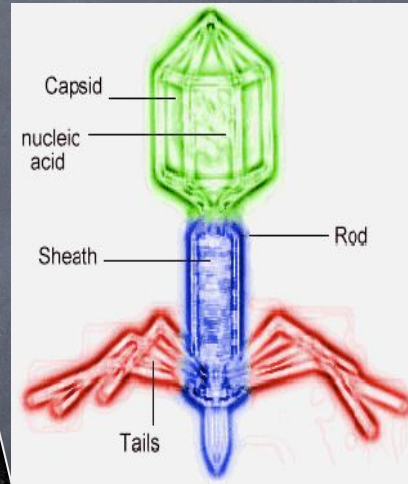
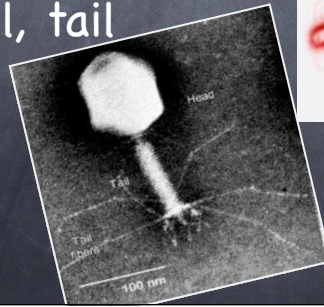




Viruses

*Structure: DNA or RNA core with a protein coat (capsid)

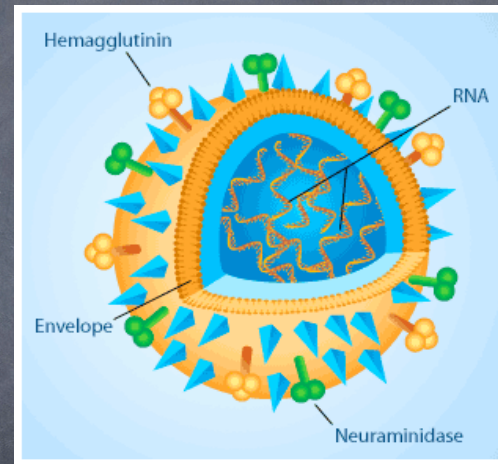
*Bacteriophage: capsid, tail, tail fibers



Virus Structure

Some have an envelope outside of capsid from host cell

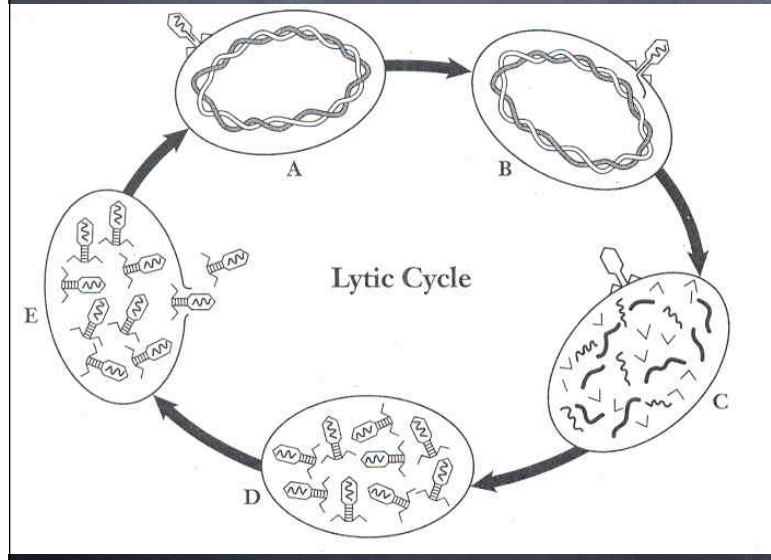
(flu, chicken pox, herpes, HIV)



<http://www.npr.org/blogs/kruhwich/2009/10/23/114075029/flu-attack-how-a-virus-invades-your-body>

Lytic Cycle

- Species/cell specific
- quick!
- takes over cell

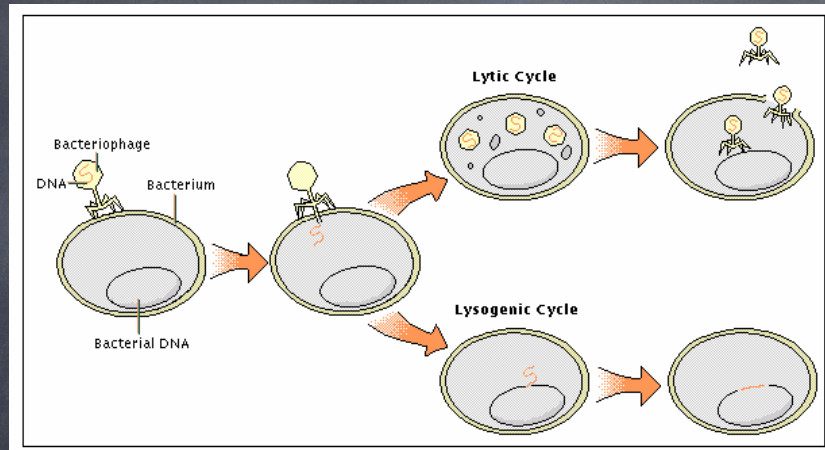


SARS
Common
cold
Influenza
Rabies

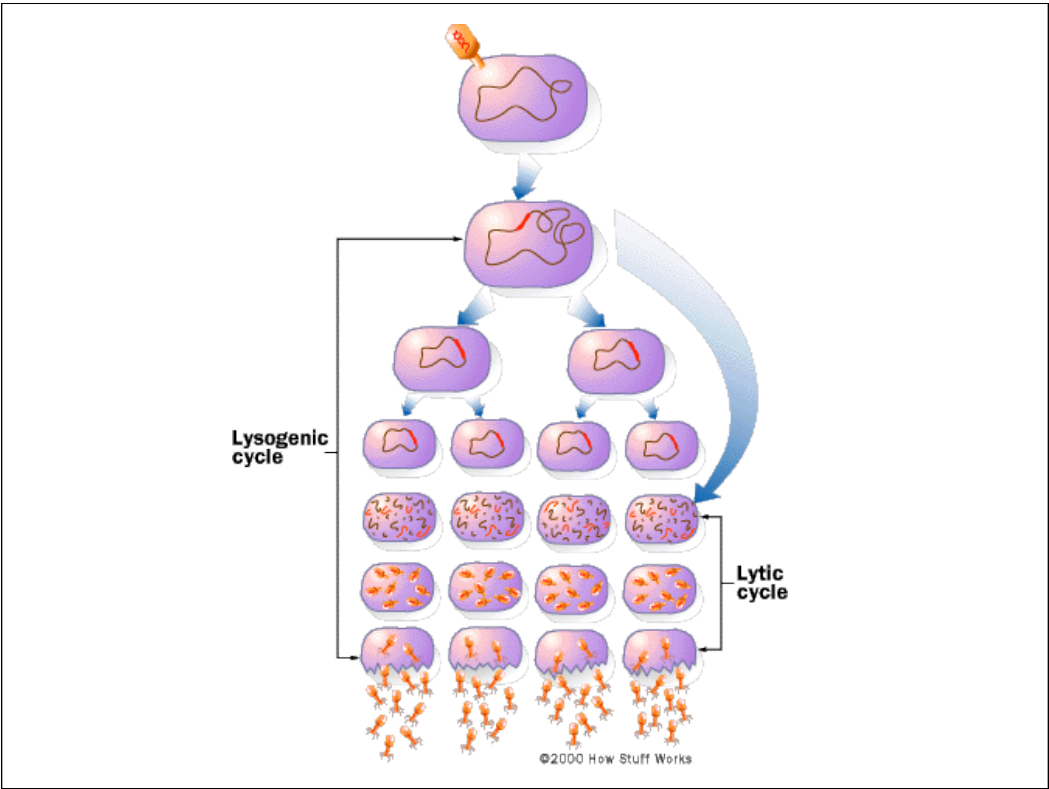
virus enters host cell
replicates virus
virus bursts from host cell, host cell dies

Bacteriophage infecting a E.Coli bacteria, Polio

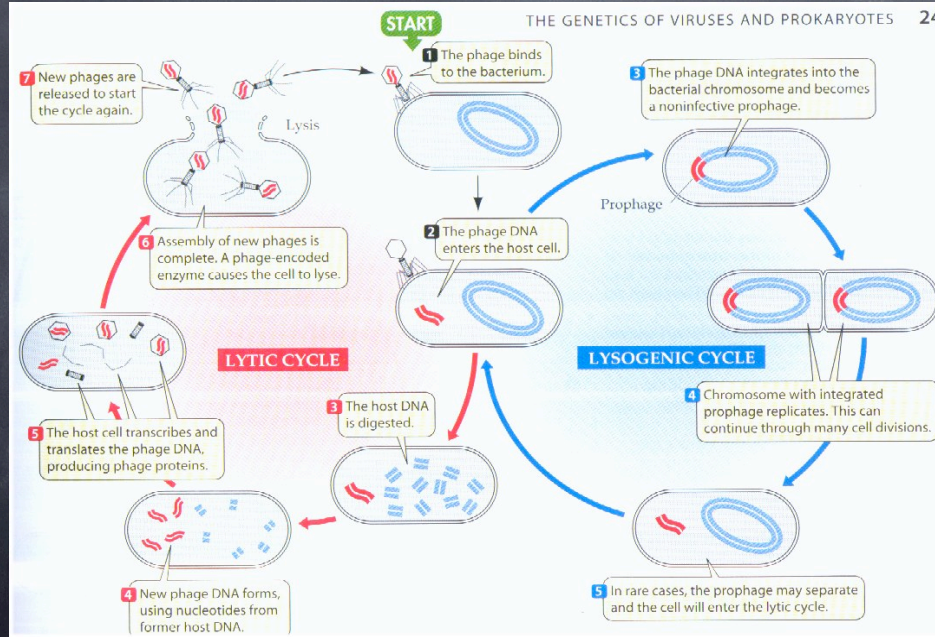
Lysogenic Cycle



- Can be long
- Virus DNA integrated into host DNA
- “Hides” until activated



Lysogenic Cycle



Lysogenic Examples

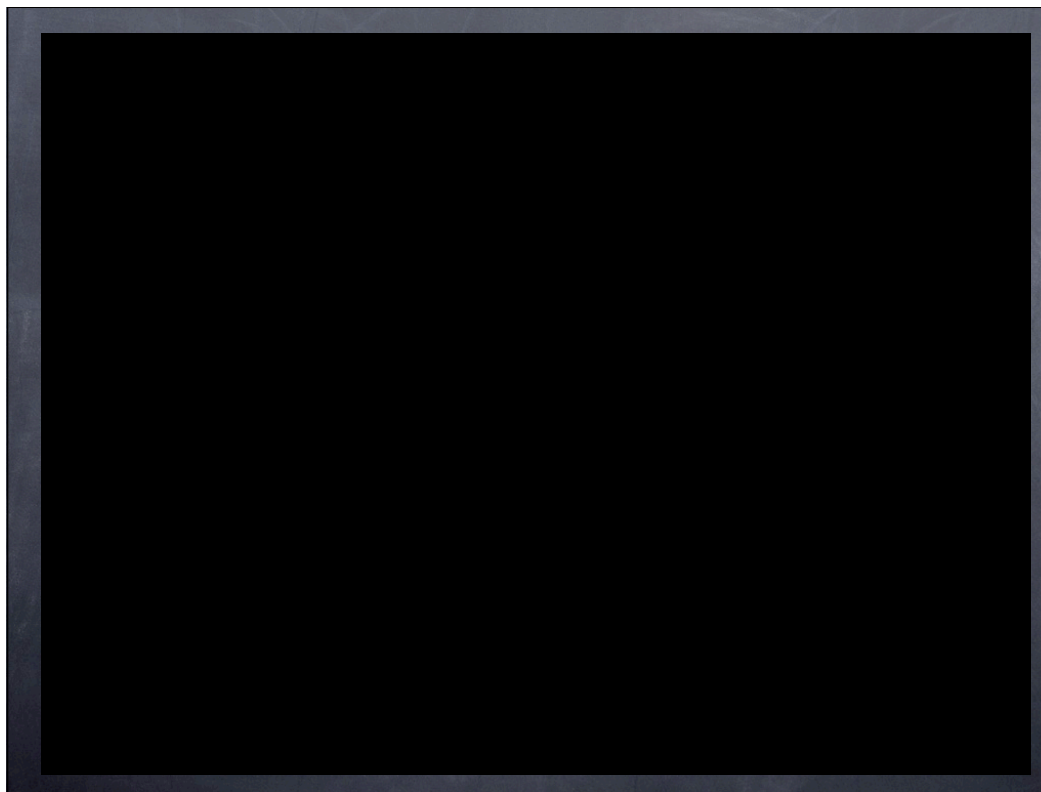
- HIV (a **Retrovirus**)
- Herpes Simplex II
- Hepatitis B
- Chicken pox..Shingles

Viruses are just bad

- Diseases: Chicken pox, measles, flu, colds, HIV, Herpes, Small pox
- Diseases of the past

Vaccines for Viruses

- Similar enough to the virus, your body produces antibodies and cells to remember the virus and attack it when they see it again
- However: colds, HIV mutate so often you can't vaccinate for them
- (The flu vaccine is just the most current strain they can predict)



Antiviral Drugs

- Interfere with the synthesis of viral DNA or capsids

Immunity

- In action
- Evolutionary arms race (32:20)

WANTED



REWARD

Must include all or most of the following:

Name (alias): Scientific name AND common name if different (Make sure it is a bacteria or virus!!!)

Cause: How to identify the cause of your disease

Transmission: Ways to get the disease

Symptoms: associated with the disease

Treatment: Medicine, therapy to treat disease

Recovery: chances for recovery from this infection

Prevention: How could outbreaks from this disease be prevented?

Frequency: Is this a rare or common disease?

Population Affected: Who might it infect? Any tips or tricks to help in the hunt for this fiend.

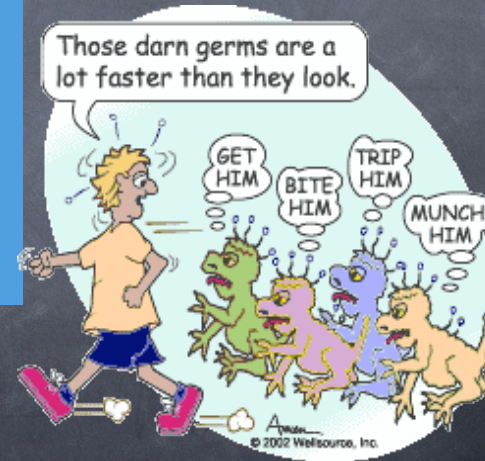
25 Point Assignment

Listed Requirements 15

Drawing/Photo/Art 5

Sources Cited 5

**MAKE SURE IT IS A VIRAL
OR BACTERIAL DISEASE!**



Citing Sources

Example: Landsberger, Joseph.
"Citing Websites." Study Guides
and Strategies . 12 May 2005.
University of X. 13 May 2005. <
<http://www.studyqs.net/citation.htm>
>.

General format: Author, last name
first. "Webpage title." Website title.
Date published/updated.
Organization/publisher. Date
accessed. < URL >

Main Ideas

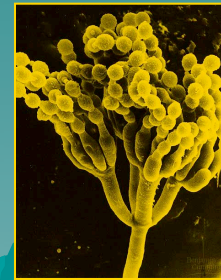
1. Antibiotics - Drugs that are used to treat bacterial infections
2. Kill bacteria by preventing them from doing three important processes:
 3. Make proteins
 3. Make cell walls
 3. Digest sugars

Details

2. Found in many common household products like soap, plastics, toothbrushes, hand lotion, etc.

Details cont.

2. Antibiotics were introduced in the 1940's and worked so well that they were used to treat everything
2. Today, widespread use of antibiotics has led to antibiotic resistance
3. Bacteria have evolved and many drugs no longer work



Details cont.

3. There are two main causes of antibiotic resistance
4. Doctors prescribe antibiotics when they are not needed
5. More antibiotics enter the environment and bacteria can adapt to them



Details cont.

4. People stop taking antibiotics once they feel better, even if they still have pills left
5. Some bacteria survive and reproduce new, resistant bacteria
5. The trait for resistance may also get traded between two bacteria



