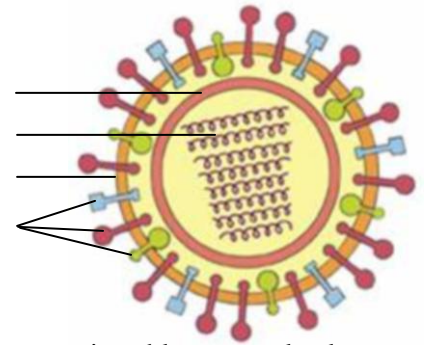


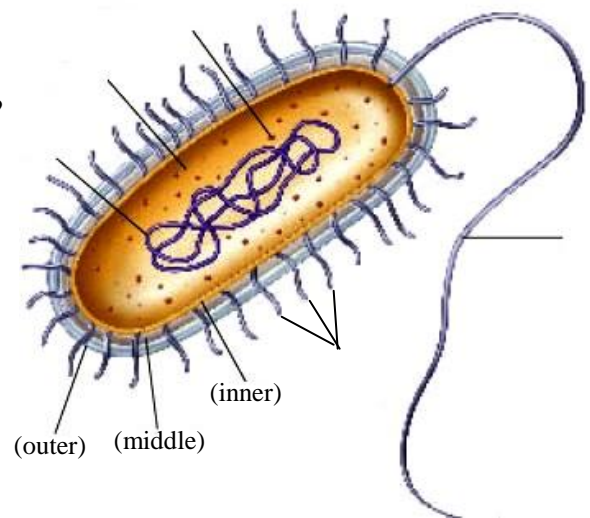
Unit 4 Review: Viruses, Archaea, Bacteria and the Immune Response

Great review at: <http://www.youtube.com/watch?v=vAR47-g6t1A> (Crash Course Biology)

1. List three diseases caused by viruses and three diseases caused by bacteria.
2. Identify three different ways that each of the following can be classified:
 - a) viruses
 - b) Archaea
 - c) bacteria
3. Label the key parts of the influenza virus shown to the right.
4. HIV is a retrovirus but influenza is not.
 - a) What additional item does HIV have that is not found in the influenza virus?
 - b) Describe how HIV reproduces when it is infectious and causing disease.
 - c) Describe how HIV could form a “provirus”
5. Small pox was caused by a DNA virus but influenza is an RNA virus. Why was a vaccine able to completely eradicate small pox on Earth (as far as we know) while a new vaccine must be made for influenza every year?
6. Use the characteristics of living things to explain why viruses are not considered to be alive.
7. Members of the domain Archaea are incredibly diverse. What are three types of Archaea and how is each unique?
8. Why is it believed that Archaea were the earliest living things?
9. What are three significant similarities between Archaea and bacteria? What are four significant differences that resulted in Archaea and bacteria being split from one Kingdom into two separate Domains?



10. Refer to the diagram of a typical bacterial cell shown to the right:
 - a) Label its key parts.
 - b) Does this bacterium have a plasmid that you can see? Explain.
 - c) What is the function of the little “tubes” on the bacteria’s surface?
 - d) What is the shape of this bacteria?
 - e) Which part of the bacteria is made of peptidoglycan?
 - f) Is it a prokaryote or a eukaryote? How do you know?
 - g) Describe how this bacteria reproduces asexually.
 - h) Describe how this bacteria reproduces sexually.
 - i) What is the main advantage of sexual reproduction?
 - j) Describe how this bacteria could develop antibiotic resistance.
 - k) This bacteria has a thick cell wall and thin slime capsule.
 - Is it Gram positive or Gram negative?
 - What colour will it be after Gram staining?



11. Compare and contrast the following:
 - a) the replication of RNA viruses and DNA viruses
 - b) the lytic cycle and the lysogenic cycle
 - c) viruses and bacteria
 - d) Archaea and bacteria
 - e) eukaryotes and prokaryotes
 - f) viruses and endospores
 - g) binary fission and mitosis
 - h) binary fission and conjugation
 - i) pili and flagella
 - j) endospore and provirus
 - k) coccus and bacillus
 - l) Gram negative and Gram positive
 - m) thermophiles and acidophiles
 - n) extremophiles and mesophiles
 - o) a fomite and a vector
 - p) specific and non-specific immune defenses
 - q) active vs. passive immunity

12. How can bacteria survive during adverse conditions? Describe this process.
13. Bacteria have an undeserved “bad rap”. What are three indispensable (critical) roles of bacteria in:
- ecosystems
 - animals’ bodies
14. For bacterial populations:
- Sketch a typical “growth curve” for bacterial populations and describe what is happening in each region
 - Describe three ways to limit bacterial growth without the use of antibiotics, antiseptics or disinfectants. Describe how each of these methods works.
 - Identify five different features or characteristics of bacterial colonies that can be used to classify or identify the bacteria.
15. Regarding antibiotics:
- What are three ways that different antibiotics can kill bacteria without harming eukaryotic cells?
 - Describe how bacterial resistance arises.
 - What is a ‘super-bug’?
 - What factors have contributed to the formation of ‘super-bugs’?
 - What three things can you do to help slow down the development of resistant bacteria?
16. Regarding the immune system:
- What is its overall purpose?
 - Describe two types of non-specific physical immune defenses and where in the body each is used.
 - Describe two types of non-specific chemical immune defenses and where in the body each is used.
 - Describe two types of active, acquired immunity.
 - Describe two types of passive immunity. What is one advantage and one disadvantage of passive immunity?
17. Explain how viruses and bacteria are used together in genetic engineering, for example, to make human insulin.
18. What is recombinant DNA? Give **ONE** example of a situation in which recombinant DNA is formed.

19. Complete the following chart to compare Archaea and bacteria:

Criteria	Archaea	Bacteria
Prokaryote or Eukaryote		
Unicellular or multicellular?		
Type of nucleic acid		
Haploid or diploid?		
Shape/form of their nucleic acid		
Main type of reproduction		
Aerobic/anaerobic or either?		
Three ways they are classified		

Answer:

- a. Various appropriate answers: Nitrogen fixation in the nitrogen cycle with an accurate description. Decomposers in any of the biogeochemical cycles (nitrogen, phosphorus, carbon) with a description.
 - b. Important producers in some ecosystems. Essential producers (chemoautotrophs) in ocean hydrothermal vent systems where they are the only autotrophs. Some importance of the cyanobacteria in certain aquatic systems.
 - c. Numerous examples: nitrogen-fixers are symbiotic on plants. Cyanobacteria in lichens. Symbionts in herbivore guts and human intestines.
 - d. Transgenic bacteria made through gene-splicing used to produce numerous products: insulin, human growth hormone, etc.
 - e. Food products: cheeses and dairy products, alcohol, acetic acid, etc. Medicine- used as source of antibiotics. Example: streptomycin from *Streptomyces*.
35. Many scientists disagree as to whether to consider viruses living or nonliving. Discuss the characteristics viruses lack that would cause them to be regarded as nonliving. What characteristics do they exhibit that might cause others to consider them as living? If you could simplify the definition of life, what might be a definition that would include viruses along with all other life forms?

Answer:

Nonliving: Not cellular, no homeostatic mechanisms, no energy requirements when dormant (other answers possible)

Living: Capable of reproduction/replication, capable of mutation and adaptation/evolution, organization evident in shape of protein covering (other answers possible)

Definition of life could be modified to include: any organism with nucleic acid; anything capable of reproduction regardless of method (other answers possible)