**Microbes: Structures and Functions of Living Organisms**

8.L.1 Structure and hazards caused by agents of disease that effect living organisms

Microbiology as a basic science explores microscopic organisms including viruses, bacteria, protozoa, parasites, and some fungi and algae. These organisms lack tissue differentiation, are unicellular, and exhibit diversity of form and size.

Viruses, bacteria, fungi and parasites may infect the human body and interfere with normal body functions. Some kinds of bacteria or fungi may infect the body to form colonies in preferred organs or tissues.

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| **Viruses*** Viruses are non-living particles composed of a nucleic acid (DNA or RNA) and a protein coat.
* Viruses need a host cell to reproduce.
* Viruses invade healthy cells and use the enzymes and organelles of the host cell to make more viruses, usually killing those cells in the process.
* Viral diseases are among the most widespread illnesses in humans. These illnesses range from mild fevers to some forms of cancer and include several other severe and fatal diseases. Transmission of these illnesses varies; some are transmitted by human contact, while others are transmitted through water or an insect bite.
* Vaccines and some anti-viral drugs are used to control and prevent the spread of viral diseases.
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| **Bacteria*** Bacteria are prokaryotic single-celled organisms.
* Bacteria can live in a variety of places (with oxygen, without oxygen, extreme hot, extreme cold).
* Bacteria reproduce through binary fission, a form of asexual reproduction. Under optimal conditions, bacteria can grow and divide extremely rapidly, and bacterial populations can double very quickly. 28
* Antibiotics are used to inhibit the growth of bacteria. Because antibiotics have been overused, many diseases that were once easy to treat are becoming more difficult to treat. Antibiotic resistance in bacteria occurs when mutant bacteria survive an antibiotic treatment and give rise to a resistant population.
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| **Fungi*** Fungi are eukaryotic, nonphotosynthetic organisms, and most are multicellular heterotrophs.
* Most fungi reproduce both sexually and asexually (producing spores). This provides an adaptive advantage. When the environment is favorable, rapid asexual reproduction ensures an increased spread of the species. During environmental stress, sexual reproduction ensures genetic recombination, increasing the likelihood that offspring will be better adapted to the new environmental conditions.
* Fungi can sometimes attack the tissues of living plants and animals and cause disease. Fungal disease is a major concern for humans because fungi attack not only us but also our food sources, making fungi competitors with humans for nutrients.
* Mold spores can cause mild to serious allergies in some people. Billions of mold spores can become airborne and may then be inhaled, triggering an allergic reaction.
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| **Parasites*** A parasite is an organism that feed on another individual, known as the host. They either live on or in their host’s body.
* Natural selection favors adaptations that allow a parasite to efficiently exploit its host. Parasites are usually specialized anatomically and physiologically. Tapeworms are so specialized for a parasitic lifestyle that they do not even have a digestive system. They live in the small intestine of their host and absorb nutrients directly through their skin.
* Infectious disease may also be caused by animal parasites, which may take up residence in the intestines, bloodstream, or tissues.
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**Review Questions**

1. List the 4 types of microbes can infect the human body and interfere with normal body functions
2. What microbe is a non-living particle?
3. Describe what a virus is composed of?
4. How do parasites feed?
5. What is the individual organism that a parasite needs known as?
6. Which parasite can cause serious allergy issues?
7. What can be used to use to inhibit the growth of bacteria?
8. What is the difference between prokaryotic and eukaryotic?