Chapter Ten: Bacteria and Viruses
Teacher Notes

Lesson One: Bacteria

-Characteristics of Bacteria
- -From the kingdoms Eubacteria and Archaebacteria
  - -contain the oldest forms of life on Earth
  - -single celled organisms
  - -one of three shapes-bacilli, cocci, or spirilla
- -The Shape of Bacteria
  - -most have rigid cell walls that give shape
  - -Bacilli-rod shaped
  - -cocci-spherical
  - -spirilla-long and spiral shaped
  - -some have flagella to help them move
- -No Nucleus!
  - -all are single celled with no nucleus (prokaryotes)
    - -prokaryotes are able to move, get energy, and reproduce
    - -function as independent organisms
    - -some stick together to form strands
    - -prokaryotes reproduce differently
- -Bacterial Reproduction
  - -bacteria reproduce by binary fission
    - -binary fission-a form of asexual reproduction in single-celled organisms by which one cell divides into two cells of the same size.
      - -step 1-cell's DNA is copied
      - -step 2-DNA is copied & attached to the cell membrane
      - -step 3-DNA and its copy separate as the cell grows larger
      - -step 4-cell splits in two-each new cell has a copy of the DNA
  - -Prokaryotes have no nucleus so DNA is in circular loops.
- -Endospores-thick-walled protective spore that forms inside a bacterial cell and resists harsh conditions.
  - -can survive in hot, cold, and very dry places
    - -example-a endospore found in an insect that had been preserved in amber for 30 million years began to grow.

-Kingdom Eubacteria
- -has more individuals than all of the other five kingdoms combined
- -they have lived on Earth for more than 3.5 billion years.
- -Eubacteria Classification
  - -classified by the way they get food
    - -most are consumers (eat other organisms)
    - -many are decomposers (feed on dead organisms)
    - -some live in or on the body of other organisms
    - -some are producers (make their own food)

-Cyanobacteria
-are producers and usually live in water
-contain chlorophyll; may also have other pigments
-example-flamingos get their pink color from eating red cyanobacteria

-Kingdom Archaebacteria
-3 main types of archaebacteria – heat lovers, salt lovers, and methane makers
-heat lovers-live in ocean vents and hot springs; usually live in temps from 60 degrees C to 80 degrees C but can survive temps higher than 250 degrees C.
-salt lovers-live in high salt content areas-Dead Sea and Great Salt Lake
-methane makers-give off methane gas and live in swamps and animal intestines.

-Harsh Environments
-often live where nothing else can
-most prefer areas with little or no oxygen
-some are still found in moderate environments
-not all have cell walls

Lesson Two: Bacteria's Role in the World

-Good for the Environment
-Nitrogen Fixation-bacteria that take in nitrogen from the air and change it to a form that plants can use is nitrogen fixation.
-Recycling-decomposer bacteria break down leaves and twigs, dead plants, and animal matter.
-Cleaning Up-bacteria that fight pollution; change harmful chemicals into harmless ones
-bioremediation-the biological treatment of hazardous waste by living organisms.
-example-used to clean up oil spills

-Good for People
-Bacteria in Your Food
-bacteria is raised for food-cheese, yogurt, buttermilk, or sour cream

-Making Medicines
-Bacteria is used to fight other bacteria
-Antibiotics-medicine used to kill bacteria and other organisms

-Insulin
-used to break down and use sugar and carbohydrates
-genes are put into bacteria so that the bacteria would make human insulin; the insulin is then separated and given to people who have diabetes.

-Genetic Engineering
-scientists change the genes of bacteria or other living things
-scientists engineer bacteria to make insecticides, cleansers, and adhesives

-Harmful Bacteria
-Pathogenic Bacteria-bacteria that cause diseases

-get inside a host and take nutrients from the host's cells; during the process they harm the hosts.

-we are protected from some of these by vaccines and can be treated with antibiotics.

-Diseases in Organisms

-bacteria can attack plants, animals, protests, fungi, and even other bacteria

Lesson Three: Viruses

-It's a Small World

-Virus-A microscopic particle that gets inside a cell and often destroys the cell

-tiny; are smaller than the smallest bacteria

-about 5 billion virus particles can fit in a single drop by blood

-can change rapidly

-because they are so small and change rapidly scientists do not know much about them.

-Are Viruses Living?

-contain protein and genetic material

-don't act like living things-can't eat, grow, break down food, or use oxygen

-viruses can't function on their own; only reproduce inside a host

-host-an organism from which a parasite takes food or shelter

-Classifying Viruses

-can be grouped by shape, type of disease they cause, their life cycle, or the kind of genetic material they contain.

-four main shapes-crystals, spheres, cylinders, spacecraft

-every virus is made of genetic material inside a protein coat

-genetic material is either DNA or RNA

-Destructive House Guest

-they make more of themselves; attack living cells and turn them into virus factories.

-A Time Bomb

-Some viruses put genetic material into the host cell but new viruses aren't made right away. It may stay inactive for a long time.

-Treating a Virus

-antibiotics don't kill viruses

-scientists have recently developed antiviral medication.

-it is best to prevent them from happening because there aren't medicines for all.

-vaccines help you fight off viruses