

**Life Science 7th Combined / Condensed Notes
For Chapters 6-7
Classification – Viruses – Bacteria – Protists - Fungi**

Ch 6 Classification, Viruses, & Bacteria

6.1 Classifying Organism 6.2 Six Kingdoms
6.3 Bacteria 6.4 Viruses

Section 6.1 Classifying Organisms

Classification = the process of grouping things based on their similarities.

* Biologists use it to organize living things into groups for easier study.

Bible's Basic System – (Hebrew term “nephesh” means a thinking, feeling being)

* Plants (Fruit bearing, grass) (Plants do not have “nephesh” – feelings, thinking)

* Nephesh Animals (Flyers, Swimmers, Walkers)

* Nephesh Man (personally made by God to reflect His character)

Each “kind” of plant or animal reproduces *only* its own kind.

A “kind” cannot evolve into another kind, like a wolf into a monkey.

- Dog kind (wolves, foxes, coyotes, domestic dogs, etc.)

The biblical term “creature” focuses on the truth of a Creator!

Man's Early Systems of Classification:

* Aristotle (Greek in 4th century B.C.) Three groups (Fly, Swim, Walk)

* **Linnaeus** (1750's) used a two-part naming system from Latin.

Dog = *Canis familiaris* (*The name is italicized*)

- **Binomial Nomenclature** = a two-part name

1. **Genus** = first part of the name (Capitalized) (Groups similar, related organisms)

2. **Species** = second part of the name. (Lowercase)

(Groups similar organisms that can mate and produce fertile offspring)

* Evolutionary theory now dominates the classification system, and assumes that similar organisms in a group evolved from a common ancestor.

* But, many scientists reject evolution and use the system only for identification.

Seven Levels of Classification:

Kingdom – Phylum – Class – Order – Family – Genus – Species

Kingdom is the biggest and broadest.

Each kingdom contains phyla – each phylum contains classes, etc.

The biblical “kind” probably referred to either the “family” or “genus” level.

The more levels that two organisms share, the more characteristics they have in common.

(Below is an easy way to remember the first letter of each level)

Kings – Place – Crowns – On – Faithful – Godly - Servants

How can you identify an organism you find?

Field Guide = book with pictures and descriptions of organisms and characteristics

Taxonomic Key = series of paired statements describing characteristics of organisms

Taxonomy = the scientific study of how living things are classified.

Section 6.2 The Six Kingdoms

Linnaeus only used two kingdoms (Plants and Animals)

Until recently, scientists used a five kingdom system that combines #'s 1 & 2 below.

Six Kingdoms are now the standard:

- 1. Archaeobacteria**
- 2. Eubacteria**
- 3. Protists**
- 4. Fungi**
- 5. Plants**
- 6. Animals**

1. Archaeobacteria (Unicellular prokaryotes – genetic material is not in a nucleus)

- * Means “ancient bacteria”, since evolutionists believe they evolved first.
- * Some live in extreme environments, like very hot water near lava.
- * Some are autotrophs, and some are heterotrophs

2. Eubacteria (Unicellular prokaryotes)

- * Means “true” bacteria, since they are more complex than archaeobacteria.
- * Similar to archaeobacteria, but their chemical makeup is different.
- * Live all over the world, including on and in your body.
- * Most are harmless, and some are very useful.

3. Protists (This is an “odds and ends” category, with lots of different types.)

- * Some are unicellular like the paramecium, yet others are multicellular (seaweed).
- * They are all eukaryotes (have a nucleus around their genetic material).

4. Fungi (Mushrooms, molds, mildew, yeast)

- * Most are multicellular eukaryotes.
- * A few like yeast are unicellular eukaryotes.
- * All are heterotrophs, and most feed on decaying organism.

5. Plants (all are multicellular eukaryotes, and all are autotrophs)

6. Animals (all are multicellular eukaryotes, and all are heterotrophs)

Section 6.3 Bacteria

Bacteria = single-celled prokaryotes (genetic material not in a nucleus).

Cell Shapes – (Spherical, rodlike, spiral)

- * Cell wall and its chemical makeup determine the shape.

Flagellum = long, whiplike structure for movement (propeller).

- * Most bacteria have no flagellum, some have one or many.

Two Kingdoms of Bacteria: Archaeobacteria and Eubacteria

- * See the earlier description of these two kingdoms.

Reproduction in Bacteria:

- * **Asexual Reproduction** = involves only **one** parent producing identical offspring.
 - **Binary Fission** = asexual reproduction where one cell divides to make two.
- * **Sexual Reproduction** = Conjugation which does not use sperm and eggs like animals
 - **Conjugation** = one bacterium transfers genetic material to another bacterium.
(Then each bacterium grows and later divides by binary fission.)

Survival Needs: Food, Water, Oxygen for some.

- * Food is broken down by respiration to release energy to run the functions of the cell.
 - * Autotrophs make own food / Heterotrophs must consume food from outside themselves
 - Autotrophs (some use photosynthesis, others in deep oceans use chemical ways)
 - Heterotrophs (consume milk, decaying leaves, other bacteria, etc.)
- (Yogurt, cheese, and apple cider are made from the activities of bacteria.)**
- * **Decomposers** = (“recyclers”) that live in soil and break down chemicals in dead animals and plants.

Endospore = a thick, rounded, thick-walled, resting cell formed inside a bacterial cell.

- * Some bacteria form this when the environment is too harsh for growth.
- * Endospores can resist freezing, heating, and drying.
- * When the environmental conditions are OK again, the bacterium begins to grow.
- * Anthrax is an example of a spore-forming bacterium.

Infectious Diseases = illnesses that pass from one organism to another.

Antibiotic = a medical chemical that can kill bacteria without harming a person’s own cells.

Section 6.4 Viruses

Analogy: Computer virus invades your PC and takes over the PC to make it do what the virus program tells it.

Virus = a small, NON-living particle that invades living cells.

- * Viruses do not use energy to grow, or respond to surroundings.
- * Viruses reproduce by invading living cells and forcing them to make more.
- * They destroy the living cell in the process.

Host = a living thing that provides a source of energy for a virus or an organism.

Parasite = organisms that live on or in a host and cause harm to the host.

- * All viruses are parasites since they destroy living cells.

Naming Viruses: NOT by a binomial nomenclature, since not alive. Named after scientists, diseases, hosts

Shapes and Sizes of Viruses:

- * Shapes - round, rods, bricklike, bulletlike, or even ROBOT like the Bacteriophage (bacteria eater)
- * Sizes – much smaller than bacteria (750 nm Strep). Virus = 22 to 250 nm (nanometer / nano = billionth)

Structure of Viruses: Two basic parts:

1. Outer Protein Coat (which locks onto certain living cells and not others)
2. Inner Genetic Core (which is injected into the cell and takes over)

How Viruses Multiply:

- * Genetic material is injected into the cell and takes over the cell’s programs.
- * Directs the cell to make more virus particles. Many new particles form inside the cell, until the cell bursts.

Active Viruses = immediately begin multiplying inside the cell.

Hidden Viruses = injects genetic material which waits until host is weak from stress before multiplying.

Viral Diseases: (Colds, Flu, AIDS, measles, Rabies, etc.)

Vaccine = a substance that stimulates the body to produce chemicals that destroy viruses or bacteria.

- * Vaccines can be made of dead or altered virus or bacteria.
- * It causes the body to be “on alert” for live invaders similar to the vaccine ones.

Notes: Ch 7 Protists & Fungi

7.1 Protists 7.2 Algal Blooms 7.3 Fungi

Section 7.1 Protists (“Odds & Ends”, or “Junk Drawer” Kingdom)

Creatures created by our Creator, God, come in all sizes, shapes, and colors.

The kingdom, “Protists”, covers many “Kinds” of creatures, that don’t fit in other kingdoms.

- * All are eukaryotes.
- * Some are unicellular, others are multicellular like giant sea weed over 100 meters long.
- * Some are heterotrophs, others are autotrophs, and some are both.

Three Groups of Protists:

1. Animal-Like Protists
2. Fungus-like Protists
3. Plant-like Protists

1. Animal-Like Protists: Called **Protozoans**

- * Heterotrophic, unicellular creatures
- * Grouped by scientists by the way they move:
 - **Pseudopod Movement (Ameba**, which is a sarcodines)
(pseudopod means false foot, & is like the blod on movies)
(**contractile vacuole** – used to squirt out extra water)
 - **Cilia Movement (cilia** are hairlike projections that move in waves)
(These protists are called ciliates, and the paramecium is an example.)
(Paramecium reproduce by either binary fission or conjugation.)
 - **Flagella Movement** (Protists called zooflagellates, using 1 to 8 flagella.
(**Symbiosis** is a close relationship between to creatures where at least one of them benefits.
Termites have a zooflagellate creature living in its intestines to help in digestion. They live in a symbiotic relationship called **mutalism**, where both creatures benefit. Giardia is a zooflagellate people parasite that causes intestinal pain.
 - **Sporozoans** (are characterized by the way they live, not how they move)
They are parasites feeding on the cells and body fluids of hosts.
Some have flagella, while others live stationary on the host.
Some have many hosts, like the malaria disease parasite (plasmodium).
(It uses both mosquitos and people.)

2. Fungus-like Protists:

- * Like fungi, they are heterotrophs, have cell walls, use spores to reproduce.
- * Unlike fungi, they can move at some points in their life cycle.
- * **Three types:**
 - (1 & 2) Water Molds and Downy Mildews:
Both of these types live in water or moist places fuzzy threads.
They attack food crops (potatos)
 - (3) Slime Molds:
Live in moist soil and on decaying plants and trees.
Some are beautiful colors. They move like amebas using pseudopods.
They eat bacteria and other microorganisms.
They can creep together and form a multicellular mass, which makes spores.
Each spore develops into a new generation of slime molds.

3. Plant-like Protists: Called **algae** & are autotrophs using **pigment** .

- * Pigments are chemicals producing color that help in photosynthesis.
- * Some algae are unicellular, living unconnected from other algae cells.
- * Others form colonies together with a few cells specializing for reproduction, etc.
(Most colony cells continue to carry out all normal functions.)
- * Some algae are multicellular like seaweed, where all cells are specialized.
- * **Types of algae:**

- **Euglenoids:** green, unicellular, heterotrophic when no sunlight, eyespot, flagellum
- **Dinoflagellates:** unicellular with stiff plates, two flagella in grooves, swirl, some glow.
- **Diatoms:** unicellular with glasslike cell walls, collect on ocean the floor as diatomaceous earth.
- **Green Algae:** use green pigment, most are uni, but some are multicellular.
- **Red Algae:** most are multicellular seaweeds, living deep in ocean.
Red pigments absorb light that penetrates deep into the water.
Carrageenan is a chemical from them used in ice cream!
- **Brown Algae:** common seaweed, which looks a lot like a plant. Gas-filled float sacs.
Some giant kelp can be over 100 meters long (300 feet).

7.2 Algal Blooms

Algal Bloom = rapid growth of a population of algae.

- * Often this produces huge amounts of toxins (poisons), killing whales, etc.
- * Whales die when they drink the water or eat fish filled with the toxins.

Salt Water Blooms are called Red Tides:

- * Red pigment in some salt water algae make the water look red.
- * Dinoflagellates and diatoms are common algae forming red tide.
- * Blooms usually occur when nutrients (food) and temperature increase.
- * Red tides are dangerous when toxins from the algae are concentrated in bodies of animals (like fish or oysters) that eat the algae, and then humans eat those animals.

Fresh Water Blooms are called Eutrophication (meaning “good feeding” in Greek

Eutrophication = process where nutrients build up in a lake or pond and cause algae to over grow.

- * Farmers spreading fertilizer, and sewer system drainage can cause eutrophication.
- * Serious consequences occur when algae bloom too much in a pond or lake:
 - The layer of floating algae stops sunlight from reaching organism at the bottom.
 - These organisms die and decay, causing bacteria to over multiply.
 - These bacteria use up the oxygen in the water and more creatures die.
 - Finally only the algae and a few other organisms survive.
- * Fresh water algae is easier to control since a lake is smaller than the ocean.
- * To stop eutrophication, scientists must find and stop the source of extra nutrients.

7.3 Fungi

Fungi Characteristics:

- * Eukaryotes
- * Use spores to reproduce
- * Heterotrophs

Cell Structure:

- * **Hyphae** = are branching, threadlike tubes that make up the bodies of most fungi.
- * Some hyphae are a continuous thread of cytoplasm with many nuclei.
- * The appearance of a fungus depends on the arrangement of the hyphae.
 - Some loosely tangled as fuzzy molds. Others packed into cap (mushrooms).

How Do Fungi Get Food?

- * Heterotrophs, but unlike humans, they absorb food through hyphae.
 - The hyphae grow all over the source of food
 - Then digestive chemicals ooze out of the hyphae into the food.
 - These chemicals breakdown the food into small, absorbable compounds.
 - Examples: some feed on dead plants, others feed on our skin.

Reproduction in Fungi:

- * Most fungi reproduce both asexually and sexually.
- * **Asexual** Reproduction occurs when there is plenty of moisture and food.
 - "**Fruiting Bodies**" are reproductive hyphae in the fungus that produce **spores**.
 - Yeast do not make spores, but reproduce by "**budding**", where a small yeast grows from the body of a "parent" yeast.
- * **Sexual Reproduction** occurs if conditions become too harsh.
 - Hyphae of two fungi grow together and exchange genetic material.

Fungi and the Living World:

- * **Decomposers** – many fungi break down the chemicals in dead organisms. This returns nutrients to the soil, and gets rid of dead plants and animals.
- * **People Food** – We eat many kinds of fungi.
 - Yeast make bread rise, due to the carbon dioxide gas they make.
 - We eat mushrooms from the store (DON'T ever eat the ones your yard!)
- * **Disease Causing Fungi** – attack plants, animals, and humans.
 - Athlete's foot fungus makes feet itch.
 - Ringworm is NOT a worm, but a fungus that makes a red ring on the skin.
- * **Disease Fighting Fungi** – *Penicillium* is a fungus that produces a chemical which kills bacteria. We make the antibiotic Penicillin from this chemical.
- * **Some Fungi help Plants** by growing around the plant roots and absorbing extra moisture and nutrients from the soil. The plant then absorbs these into its roots.
- * **Lichens** – are a combination of a fungus and either algae or autotrophic bacteria.
 - They live in a mutualistic relationship.
 - The fungus benefits from the food produced by the autotrophic organism, while it, in turn, gets water and minerals from the fungus.
 - Lichens break down the rocks into soil. are very sensitive to pollution, so we can watch their growth to monitor air quality in an area.