

BIOLOGY STUDY GUIDE
CHAPTER 1–THE SCOPE OF BIOLOGY

- **Biology:** the study of life; includes looking at all living things on the planet and studying tiny individual cells that make up each living thing.
- One way to study life on earth is to study it from the largest view to the tiniest:
 - o **Biosphere:** All parts of the planet that contain living things.
 - **Ecosystem:** A community of all living things living in one specific area PLUS all the non-living parts of that area that support life (water, air, sun, etc.). An example of an ecosystem would be a desert, a rain forest, etc. *Ecosystems are **dynamic** (constantly changing) places!!!*
 - **Organism:** an individual living thing (**microorganism** = a microscopic organism)
 - o **Cells:** life's basic unit of structure and function; cells are microscopic. ALL ORGANISMS ARE MADE OF ONE OR MORE CELLS!
 - **DNA and genes:** found inside a cell (usually contained inside something called a **nucleus**); **DNA** is the chemical responsible for inheritance, or the passing on of traits from parent to child; a **gene** is a small piece of DNA that codes for a particular trait (hair color, for example).
- **Life's Diversity of Species:**
 - o **Species** = distinct form of life
 - There are approximately 1.5 million species in existence. (There are 300,000 species of plants, for example.)
- **Biological Classification** = the process of organizing similar species into large groups.
 - o Humans, insects, and reptiles belong to different species, BUT they are all part of the larger group called the animal kingdom.
- **Three domains of life:**
 - o **What is a domain?**
 - A domain is the broadest (largest) classification group.
 - There are three biological domains:
 - **ARCHAEA** = one-celled organisms belong to this domain. These organisms are called **prokaryotes** because their cells do NOT have a nucleus. (**PR**okaryotes are **PR**imitive.)
 - **BACTERIA** = one-celled organisms called bacteria belong to this group. Bacteria are different in several ways from the organisms that belong to Archaea. You will learn more about this later!

- **EUKARYA** = includes four major groups of organisms:
 - **Protists**
 - **Fungi**
 - **Plants**
 - **Animals**
 - All organisms in the Eukarya domain are eukaryotic, meaning their cells have a nucleus.
 - Some organisms in Eukarya are one-celled while others are multicelled.

- **TEN MAJOR BIOLOGICAL THEMES:**
 - 1) **The body is a living system**, or a complex organization of parts that interact with each other. (Not only is the body a living system, but every ecosystem can be considered a living system.)
 - 2) **All living things are made of cells.**
 - If an organism is multicelled, its cells are organized into tissues; those tissues are organized into organs; those organs are organized into organ systems (the digestive system, for example).
 - Cells → Tissues → Organs → Systems
 - 3) **Form (structure) follows function.** In other words, the structure of a particular body part is perfectly designed for the function that body part performs. (A bird's wing is perfectly designed for flight; our hands are perfectly designed for grasping, etc.)
 - 4) **Reproduction and Inheritance**
 - Parents produce children (offspring) who look similar to them.
 - Inheritance = the passing of traits from parents to children
 - Genes are responsible for family resemblance.
 - Genes are made of DNA; half of your DNA came from your mother and half came from your father.
 - 5) **Interaction with the Environment**
 - NO organism is completely isolated from its surroundings. EVERY ORGANISM INTERACTS WITH ITS ENVIRONMENT.
 - For example, a plant gets water from the soil, carbon dioxide from the air, and energy from the sun. The plant then uses the water, carbon dioxide, and energy to make its own food through a process called **photosynthesis**. Further, plants give off oxygen as a waste product; other living things (like humans) then use this oxygen to survive.
 - All living things respond to **stimuli** (changes in the environment).
 - 6) **Energy and Life**
 - All organisms do some kind of work and therefore need energy.
 - Many organisms get their energy in a chemical form (sugar, fats, etc.)

- **Producers** = organisms that make their own food; also known as **autotrophs**.
- **Consumers** = organisms that eat the food made by producers (also known as **heterotrophs**).
- **7) Regulation**
 - Organisms are able to regulate/control their internal environments (the insides of their bodies).
 - For example, if you get too hot, your body sweats to help you cool down.
 - All organisms are able to maintain **homeostasis** = a state of balance, a steady state (when everything is as it should be).
- **8) Adaptation and Evolution**
 - **Adaptation** = inherited trait/characteristic that helps an organism survive and reproduce in its environment.
 - **Population** = a group of organisms that belong to the same species and live in the same environment at the same time
 - **Natural Selection** = Individuals with favorable/good adaptations that help them survive will live longer and produce more children than those organisms without the good adaptations. (The simple way to describe natural selection is “survival of the fittest”.)
 - **Evolution** = a generation-to-generation change in the proportion of different genes in the population; evolution can also be defined as the ability of a species to change over time.
 - Evolution occurs because of natural selection.
- **9) Biology and Society**
 - Realize that modern biology affects our everyday lives (environmental research, medicine, animal cloning, stem cell research, etc.)
- **10) Scientific Inquiry**
 - The process of asking questions about nature and then using observations and experiments to try to answer those questions.