

Bacteria to Plants - Ch 1

Living Things

aka: organisms

What is Life?

In your journal:

- What are the six characteristics of living things? - briefly describe each
- What are the major chemicals found in cells?
- Do organisms arise from non-living matter? Explain. Which scientists' experiments disproved spontaneous generation?
- What are the four basic needs of all living things?

Characteristics of Living Things

- Cellular organization - made of a cell (unicellular) or many cells (multicellular)
- Contain similar chemicals - most common is water; also carbohydrates, proteins & lipids, nucleic acid
- Energy use - to grow & work
- Growth (size) and development (complexity/maturity)
- Respond to changes in the environment
- Reproduction - produce offspring

Needs of Living Things

- **Energy** - **autotrophs** (makes own food) or **heterotrophs** (feeds on other organisms)
- **Water** - dissolves more chemicals than any other substance; carries food, oxygen, wastes; can aide movement & reproduction
- **Space** - place to live (get food & water & find shelter)
- **Stable internal conditions** - maintained despite changes in surroundings (**homeostasis**)

Experiments of Redi & Pasteur

- **Fransesco Redi** - helped disprove the idea of **spontaneous generation*** by performing a controlled experiment that involved a closed jar of meat
- **Louis Pasteur** - helped disprove the idea of spontaneous generation by performing a controlled experiment that involved a sealed flask of broth

(*mistaken idea that living things arise from nonliving sources)

Scientific Investigation (Controlled Experiment)

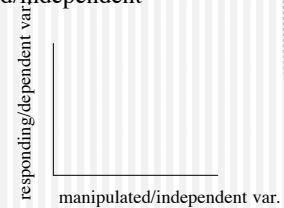
- **controlled experiment** - an experiment in which all factors are identical except one; frequently uses a "control" (unchanged) group for comparison
- **scientific question** - question that can be answered by observation & measurement (testable)
- **hypothesis** - predicted outcome to a scientific investigation based on prior experience or knowledge

Scientific Investigation

- **Variable** - any factor in an experiment that can be changed or needs to be controlled
- **Manipulated variable** - factor that is intentional changed to observe the effect
- **Responding variable** - factor that changes as a result of the m. v. (what's measured)
- **Controlled variables** - factors that are kept constant during the experiment

Graphing Variables

- **DRY** (dependent/responding variable; Y-axis)
- **MIX** (manipulated/independent variable; X-axis)



Scientific Investigation

- **observations** - determining the properties of an object or event by using the senses
- **data** - measurements and observations recorded in the process of an investigation
- **repeated trials** - repeating experiment to verify results or improve the validity of results

Controlled Experiments

- **conclusion** - final statements regarding the outcome of an experiment; addresses the hypothesis and includes supporting or contrary data
- **inferences** - drawing conclusions about a specific event based on observations & data
- **model** - physical or mental representations of the real world that help to explain a phenomenon or process

Classifying Organisms

In your journal:

- Why do scientists classify organisms?
- Briefly describe the contributions of Aristotle, Carolus Linnaeus, and Charles Darwin to classification.
- What are three clues that help you recognize a scientific name?
- What are the seven (major) levels in the modern classification system?
- What are two tools to identify an organism?

Classifying Organisms

In your journal, list & define the following:

- fossil (section 2)
- classification
- taxonomy
- binomial nomenclature
- genus
- species
- evolution
- taxonomic key

Why Classify?

Biologists use classification to organize living things into groups so that the organisms are easier to study. More specifically, ...

Why Classify?

- Classifying helps scientists to organize and identify all the different organisms they find
- It is easier to track, record, and research organisms if they are arranged in groups (& subgroups)
- It is often easier to discuss things as groups
- Knowing a group means you know something about its various members
- It gives scientists something to do and helps them feel important when they use fancy latin names
- (Guys, it really impresses the girls --*Bos taurus*!!!)

Who's to Blame?

- Aristotle
 - first classified organisms based on observable characteristics, such as how they moved & where they lived
- Linnaeus
 - Classified organisms by observable characteristics
 - Created a two-part naming system to ID organisms
- Darwin
 - Proposed that organisms changed (evolved) over time
 - Suggests that organisms be classified based on common ancestry (evolutionary history)

How to recognize an S.N.?

- Each organism has a unique scientific name
- Each name has two parts: *Genus* and *species*
- The *Genus* name begins with a capital letter; the *species* name begins with a lowercase letter
- The two names are *italicized* (underlined in older manuscripts)
- The two names are in Latin -- forcing everyone to use a language that no one else uses any more ;-)
- Sometimes genus or species name is abbreviated:
Bos taurus --> *B. taurus* or *Bos sp.*

Scientific Names

- Provides a unique name for each type of organism -- used by all scientists, everywhere
- Avoids confusion caused by common names, which can vary from place to place
- Latin terms provide some clues to the organisms' characteristic, location, or discoverer

Classifying organisms

- Modern classification based on the idea of evolutionary history
- Organisms with similar histories are classified more closely together
- Clues used:
 - Body structure
 - Fossils
 - Early development
 - Chemical makeup of cells (DNA)

Tools to ID an Organism

- Field guides
 - provide information about the organisms found in a particular area
 - Many contain pictures & descriptions
 - Often organized into groups or taxa
- Taxonomic keys
 - Paired statements providing a step-by-step process for unlocking (hence -- "key") to an organisms's ID
 - Uses physical characteristics to distinguish organisms

Key Terms

fossil (from Section 2)

- trace of an ancient organism that has been preserved in rock or other substance

classification

- Process of grouping things based on their similarities

taxonomy

- Scientific study of how living things are classified

binomial nomenclature

- Unique two-part naming system for organisms developed by Linnaeus

Key Terms

genus

- Group of similar, closely related species

species

- Group of organisms that can mate and produce fertile offspring

evolution

- Process by which species gradually change over time

taxonomic key

- Series of paired statements that describe the physical characteristics of different organisms

Seven levels of classification

Kingdom

___ Phylum

___ Class

___ Order

___ Family

___ Genus

___ Species

Six Kingdoms

In your journal:

- What are three characteristics by which organisms are placed in the Kingdoms
- Create a table that contains the following:
 - The six kingdoms of organisms
 - List the identifying characteristics for the organisms found in each kingdom
- List & define the following terms:

▪ nucleus	▪ autotroph
▪ prokaryote	▪ heterotroph
▪ eukaryote	▪ unicellular
	▪ multicellular

Six kingdoms of living things

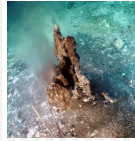
- Archaeobacteria
- Eubacteria (formerly Monera)
- Protists
- Fungi
- Plants
- Animals



Six kingdoms of living things

Archaeobacteria

- means "ancient bacteria"
- unicellular
- prokaryote
- autotroph or heterotroph
- found in extreme environments - ocean floor, hot springs, intestines
- live only in places without oxygen

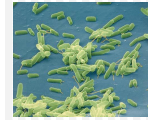


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Six kingdoms of living things

Eubacteria

- unicellular
- prokaryote
- autotroph or heterotroph
- chemical makeup different from archaeobacteria; live in places with oxygen
- some are harmful (cause illness); most are helpful



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Six kingdoms of living things

Protists

- most unicellular; some multicellular
- eukaryote
- autotrophic or heterotrophic
- diverse kingdom; considered "odds & end" - organisms that don't fit in other kingdoms
- include: amoeba, diatoms, and seaweeds



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Six kingdoms of living things

Fungi

- mostly multicellular, some unicellular (yeast)
- eukaryote
- heterotrophic
- most feed on dead or decaying organisms
- found almost everywhere on land; only a few live in water
- include: mushrooms & mold

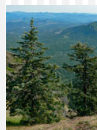


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Six kingdoms of living things

Plants

- multicellular
- eukaryote
- autotrophic
- feed almost all heterotrophs on earth
- includes: lowly mosses to giant sequoias



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Six kingdoms of living things

Animals

- multicellular
- eukaryote
- heterotrophic
- many different adaptations for finding and consuming food
- found in many diverse environments
- include: fish, reptiles, birds, mammals, and others



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