

Hierarchy of Life

- ✓ Living things can be studied on many different levels
- ✓ Smaller living systems are found within larger systems
- ✓ Studies at all levels make important contributions to the quality of human life

Levels of Organization

Studied by all kinds of scientists:

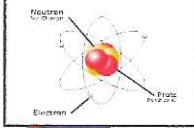
- Molecular Biologists
- Doctors
- Zoologists
- Ecologists
- Population Biologists

Elementary Particles

- ✓ Cannot be broken down into smaller pieces

Composed of:

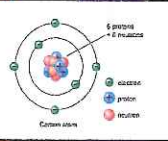
- Protons-positive
- Neutrons-neutral
- Electrons-negative



Atoms

- ✓ Anything that is found in the Periodic Table of Elements

Ex Carbon, Hydrogen and Oxygen



Molecules

- ✓ Groups of 2 or more different elements
 - smallest unit of most chemical compounds
 - too small to see, even with a microscope
 - held together with bonds

Ex NaCl= sodium chloride; H₂O= water



Organelles

- ✓ Mini organs that are inside of cell that carry out life functions

Ex nucleus, ribosome



Cell

- ✓ Smallest functional unit of life
 - All living things are made up of cells
 - contains organelles

unicellular(1 cell) **multicellular(more than 1)**

Ex bacteria- prokaryote
protists- eukaryote

Ex plants, animals



Tissue

- ✓ Groups of cells that perform a particular function
 - only 1 type of cell

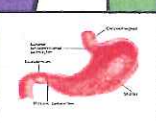
Ex muscle, nervous, epithelial, connective



Organ

- ✓ Made of several tissues that carry out a specific function
 - made of at least two types of cells

Ex stomach, heart, brain



Biosphere

- ✓ The part of Earth that contains all biomes. The highest part of the biosphere to the lowest is 14 miles. The Earth, itself, is considered to be the **Biosphere**



Biome

- ✓ A complex of terrestrial communities that covers a large area and is characterized by certain soil and climate conditions and certain assemblages of plants and animals

Ex desert, tundra



Ecosystem

- ✓ A community and its non-living surroundings
 - abiotic and biotic factors are present

Ex a forest with its community (bears, insects, trees) and its non-living surroundings (sunlight, ect.)



Community

- ✓ All things that are in a particular area

Ex 1. grass, trees, flowers, insects in your yard
2. giraffes, elephants, gazelle, trees and other animals in the African plains



Population

- ✓ Group of organisms of one type that live in the same area
 - must be SAME organism and SAME area

Ex 1. herd of cows in a prairie
2. blades of grass your front yard



Organism

- ✓ Individual living things
 - You and I are both organisms

Ex dogs, humans, trees



Organ System

- ✓ Group of organs that form a particular function

Ex digestive system, respiratory system, circulatory system



Hierarchy of Life

Eco- means "house"

Ecology

-ology means "study of"

-the study of the relationship between living organisms and their environment

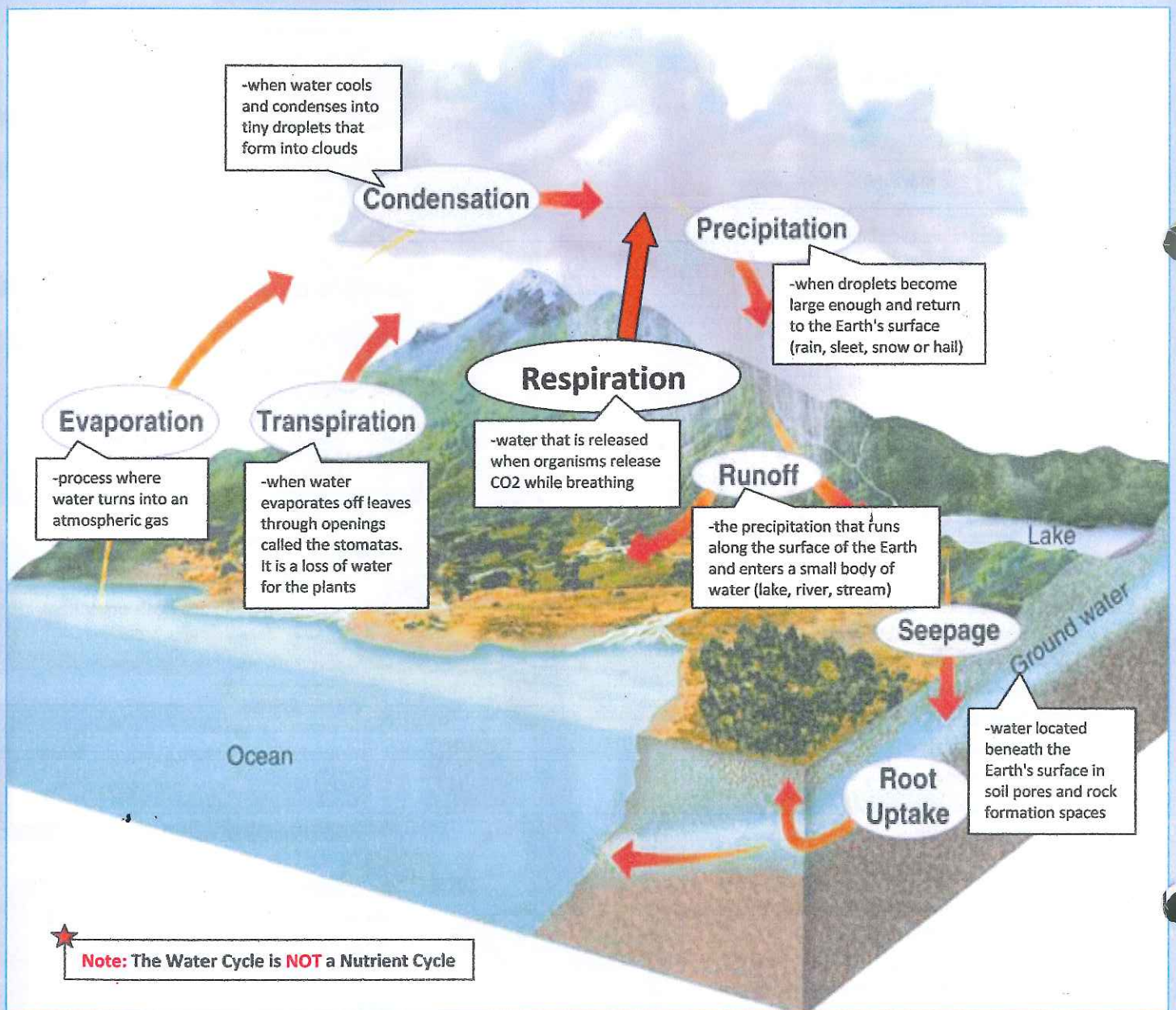
Elements, chemical compounds, and other forms of matter are passed from one organism to another and form one part of the biosphere to another through **biogeochemical** cycles

Biogeochemical cycle

1. Biological 2. Geological 3. Chemical

Cycle- complete round of series of occurrences that repeats or is repeated

The Water Cycle



Note: The Water Cycle is **NOT** a Nutrient Cycle

Hierarchy of Life

Nutrient Cycles

All chemical substances that an organism needs to sustain life are called Nutrients

Every living organism needs nutrients to build tissues and carry out essential life functions. Like water, nutrients are passed between organisms and the environment through biogeochemical cycles.

3 Most important Nutrient Cycles are:

1. The Carbon Cycle
2. The Nitrogen Cycle
3. The Phosphorus Cycle

The Carbon Cycle

Carbon is the key ingredient in living tissues.

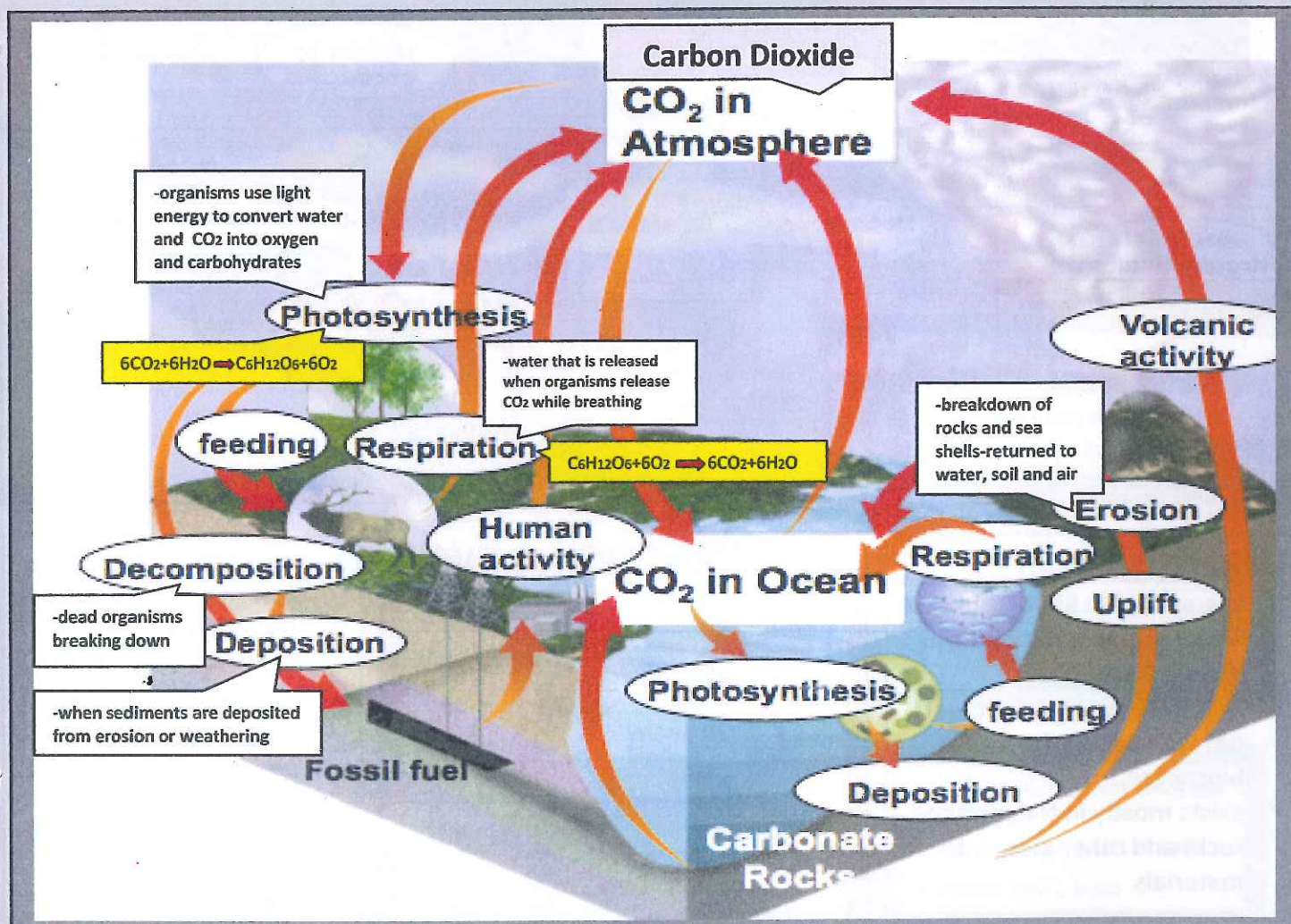
Ex CaCO_3 (Calcium Carbonate)= bone

Carbon is a crucial component of the environment.

Ex CO_2 -what plants take in and use to make food

Ways carbon moves through the cycle:

1. Biological Processes- photosynthesis, respiration, decomposition
2. Geochemical Processes- erosion, volcanic activity, deposition
3. Biogeochemical Processes- decomposition of dead material into fossil fuels
4. Human activity- mining cutting of forests, burning of fossil fuels



Hierarchy of Life

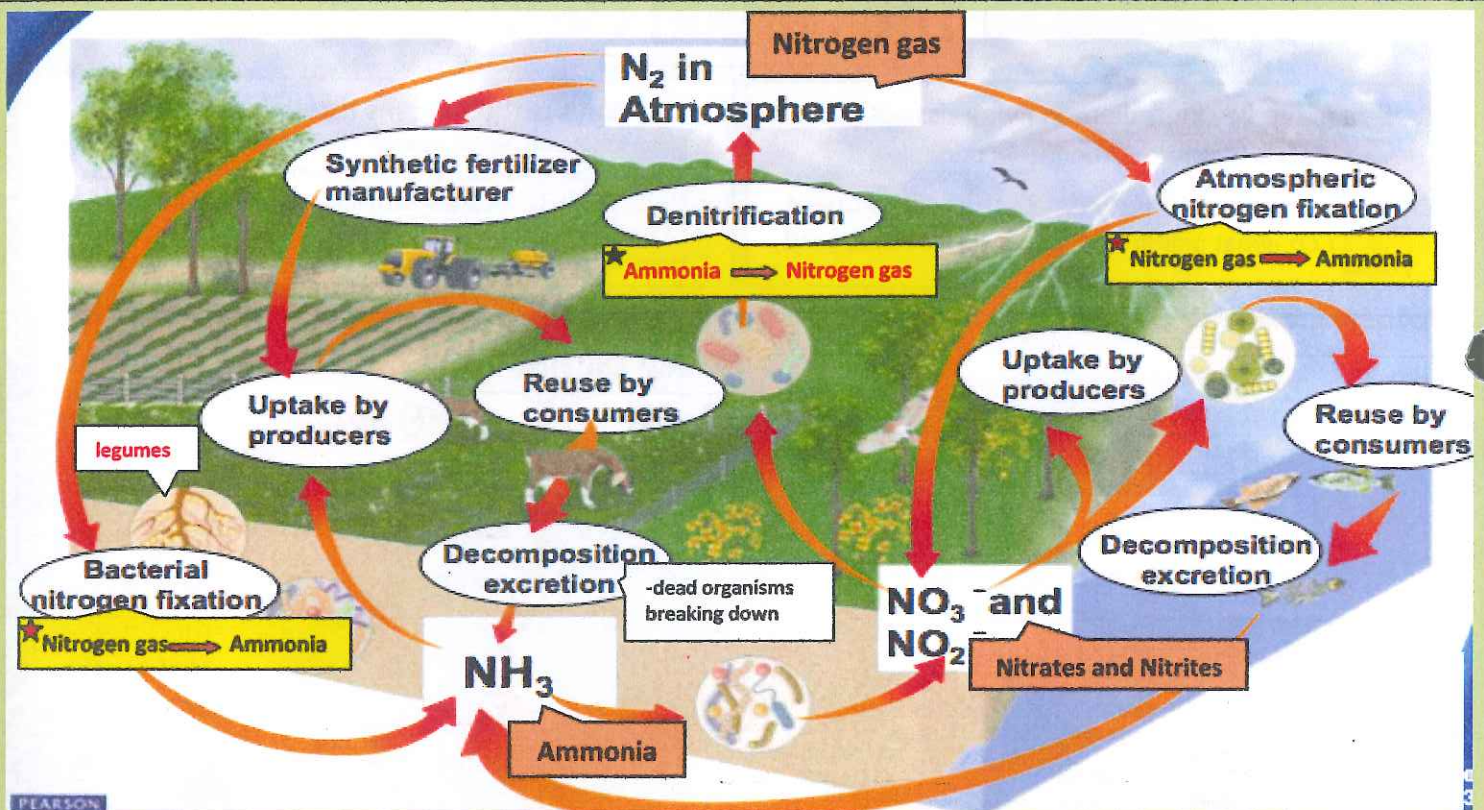
The Nitrogen Cycle

Nitrogen:

- ✓ is found in several fertilizers that we use
 - ✓ is found in the waste produced from many dead organisms
 - ✓ is found in the ocean and other large bodies of water
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- ✓ Living things need nitrogen to make **proteins**
 - ✓ **No living thing** can use nitrogen gas (N_2 Gas)
 - ✓ Nitrogen gas makes up **78%** of the atmosphere

Nitrogen and Bacteria

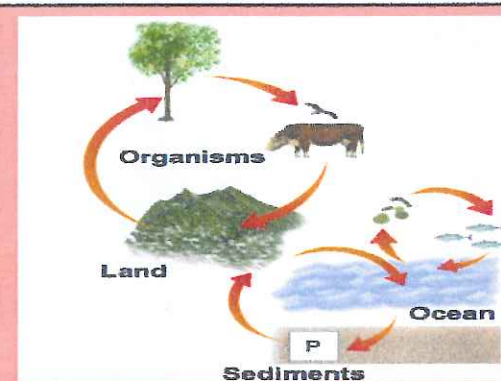
- Bacteria can turn nitrogen gas (N_2) into ammonia (NH_3) in order to make proteins through a process called **nitrogen fixation**★
- Bacteria that can **fix nitrogen** can be found in the roots of plants called **legumes** (beans, peanuts)
- Bacteria can turn ammonia (NH_3) into nitrogen gas (N_2) into the atmosphere in a process called **denitrification**★
- Bacteria can turn ammonia (NH_3) into nitrates and nitrites (NO_2/NO_3), used by plants to make proteins, then consumers can intake those plants and intake that same protein



Phosphorus:

- ✓ is essential to life because it forms important molecules like **DNA** and **RNA**.
- ✓ is extremely important; but not common in the biosphere.
- ✓ exists mostly in the forms of rocks and other inorganic materials

The Phosphorus Cycle



- Once inorganic forms are broken down, usable phosphorus is absorbed by plants and made into organic compounds.
- Organic compounds are moved through the food web, from producers to consumers and back into the ground once an organism dies.