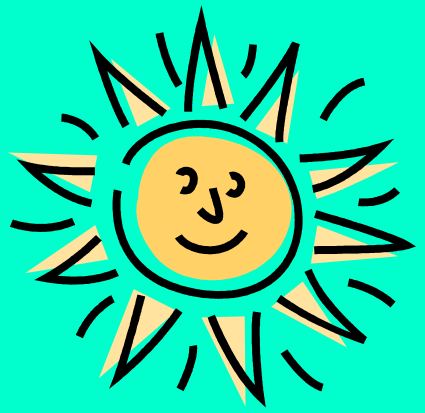
Ecology

The study of organisms and how they interact with other organisms and their environment.

I. Factors that Effect Living Things

A. Abiotic factors

- Nonliving parts of the environment that effect organisms
  - **Example: Air, waves, temperature, light, soil**
- Can determine which species live in a certain environment



B. Biotic factors

- All the living organisms that live in an environment
  - **Example: plants, animals, bacteria, protista, fungi, photosynthesis and respiration**

II. Organization in Ecology

A. Organism – **one** individual living thing
   - 1 pine tree, 1 squirrel

B. Population – a **group** of 1 species that interbreed and live in the same place
   - A forest of pine trees, a group of squirrels

C. Community – several different populations that interact

- **Forest, squirrels, deer and robins**

D. Ecosystem – All the populations in a community <u>plus the abiotic factors</u>

- **3 Major Kinds**
  1. **Terrestrial Ecosystem – land**
  2. **Freshwater Ecosystem – ponds, lakes and streams**
  3. **Saltwater or Marine Ecosystem – oceans, bays (75%)**

III. Organisms in Ecosystems

A. Habitats – where organisms live
   - Burrows underground, nests in trees
     - Example: Polar bears in the Arctic

B. Niche – the role of the organism
   - Where and organism lives and what it eats
     - If an organism has a niche that no other organism has there is less competition
     - Example: Polar bears as the top carnivore in the Arctic

C. Symbiosis – different organisms that live together (relationship)

- Types of Symbiosis

1. Parasitism – 1 species benefits the other harmed

2. Commensalism – 1 species benefits the other not harmed

3. Mutualism – both species benefit

Energy Flow

Chapter 2.2

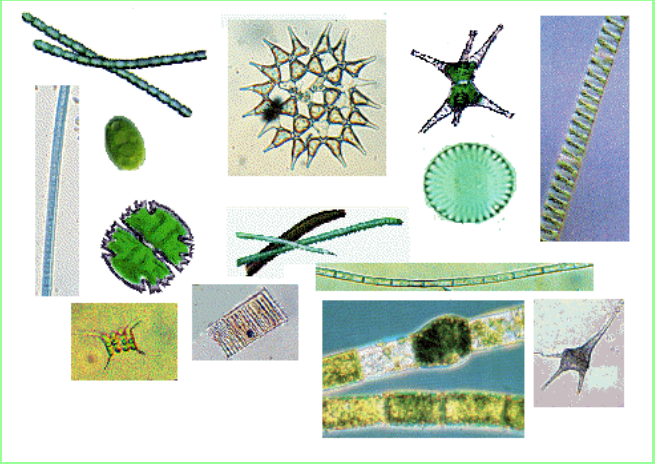
What is the ultimate source of energy for all living things on Earth?

The Sun

IV. How organisms obtain energy

A. Producers (Autotrophs)

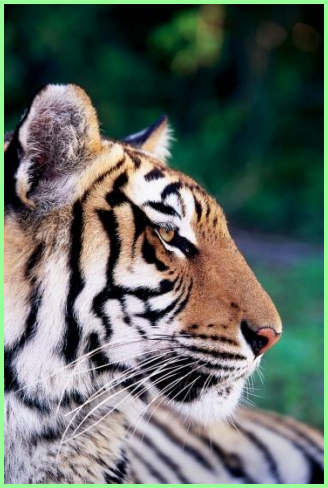
- Use photosynthesis and the sun's energy to make food
- All plants and some bacteria
- All consumers depend on autotrophs for their nutrients and energy



B. Consumers (Heterotroph)

- Can not make their own food and feed on other organisms
- 6 types of consumers
  1. **Herbivores – eat producers "plants" (primary consumers)**

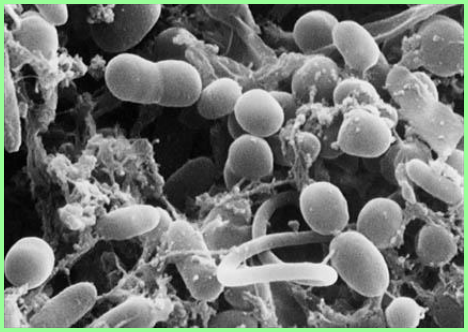
2. Carnivores – eat other consumers, "meat eaters" (secondary consumers)



3. Omnivores – eats both producers and consumers, "plant & meat eaters" (secondary consumers)

4. Scavengers – eats dead animals

5. Decomposers – break down dead and decaying plants and animals (fungi and bacteria)



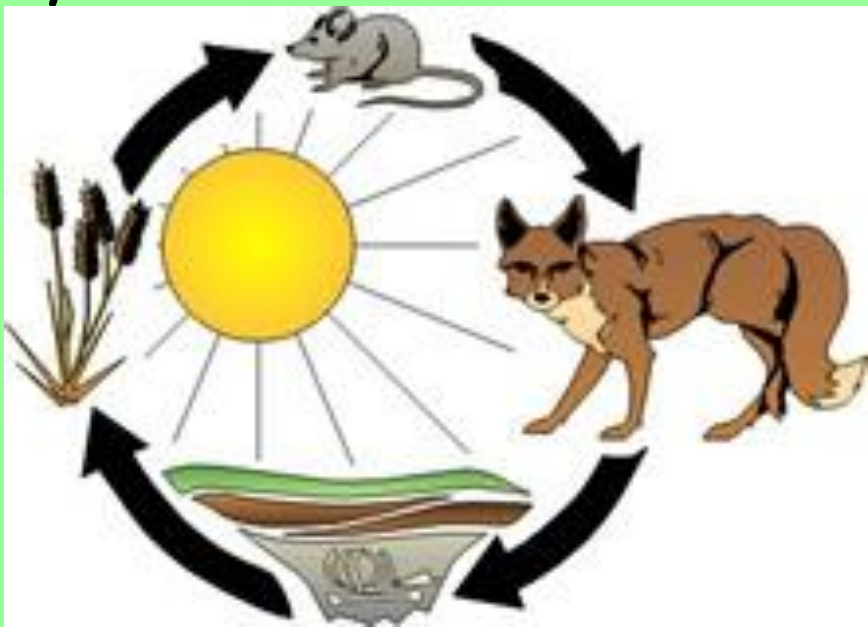
6. Detritivores

- **Detritivores (Scavengers)**
  - Feed On Dead Plant & Animal Remains (buzzards)

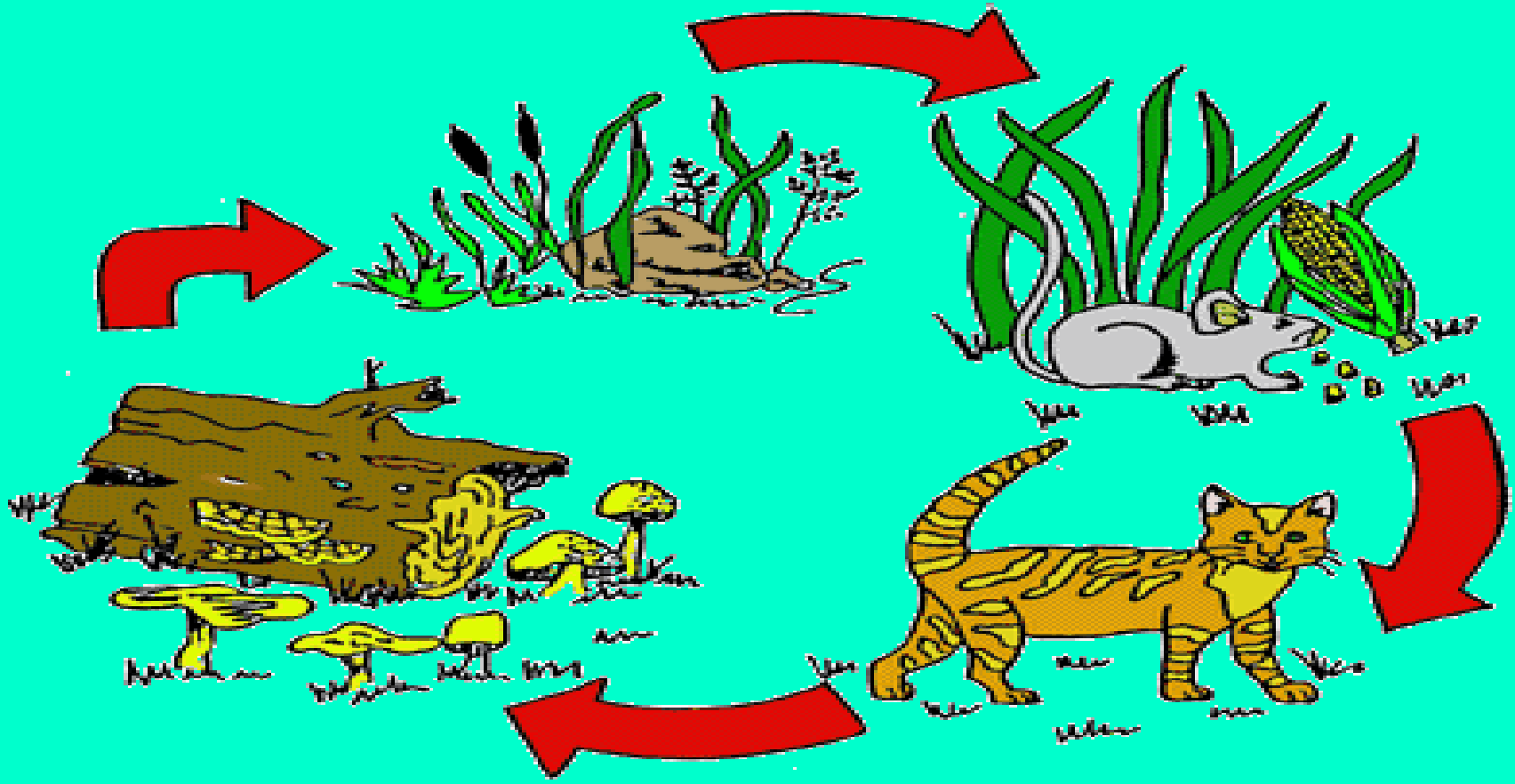
V. Energy Flow and Matter

A. Matter and energy move through a system (by moving through organisms)
   - Matter – Carbon and nitrogen

B. Food Chains
   - Simple models used to show how energy and matter move in a system
   - 3 to 5 links



Name the Producer, Consumers & Decomposers in this food chain:



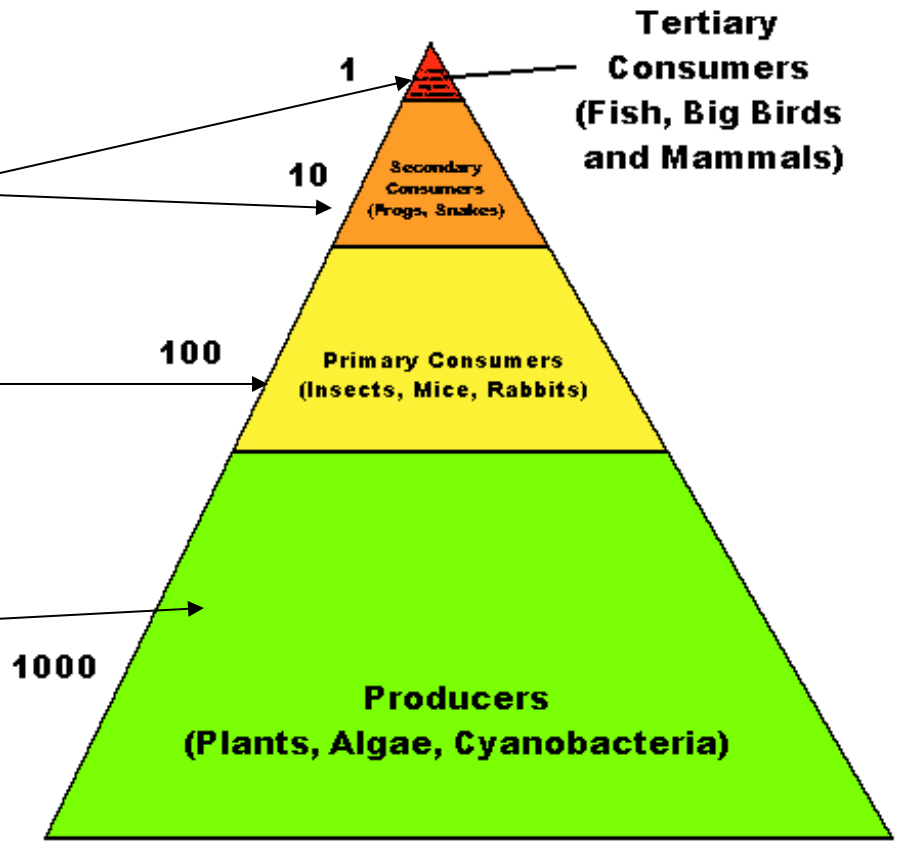
C. Trophic Levels

- Each organism is a level
- Use pyramids because energy decreases as it moves up the food chain
- 90% lost!!!

Carnivores/Omnivores

Herbivores

Autotrophs



*Only 10% moves on

- Energy is used for:
  - Metabolism (released as <u>HEAT</u>)
  - Building body tissues
  - waste

D. Food Webs

- Models used to show all feeding relationships at all levels
- More realistic than food webs

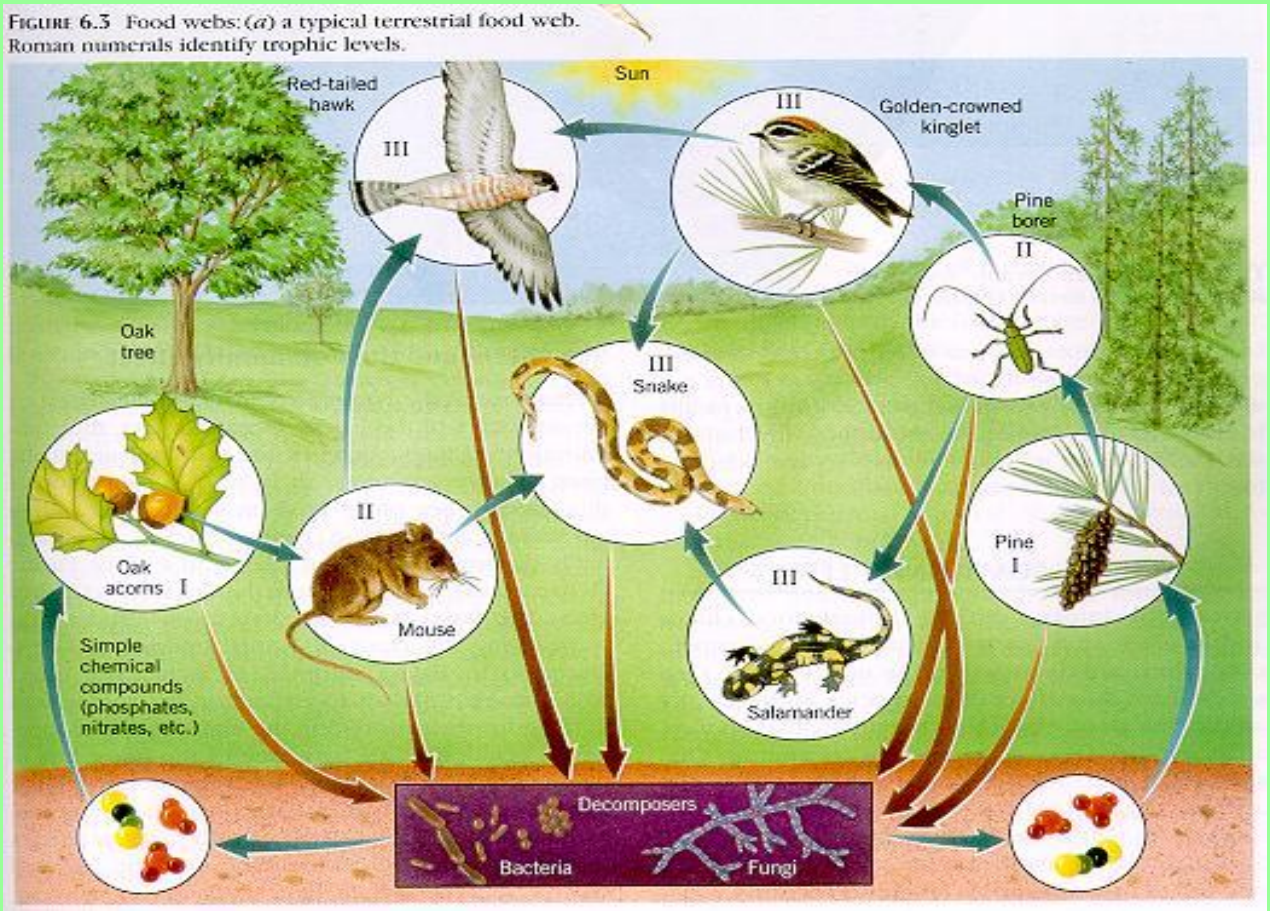


FIGURE 6.3 Food webs: (*a*) a typical terrestrial food web. Roman numerals identify trophic levels.

Ecological Pyramids

Graphic Representations Of The Relative Amounts of Energy or Matter At Each Trophic Level

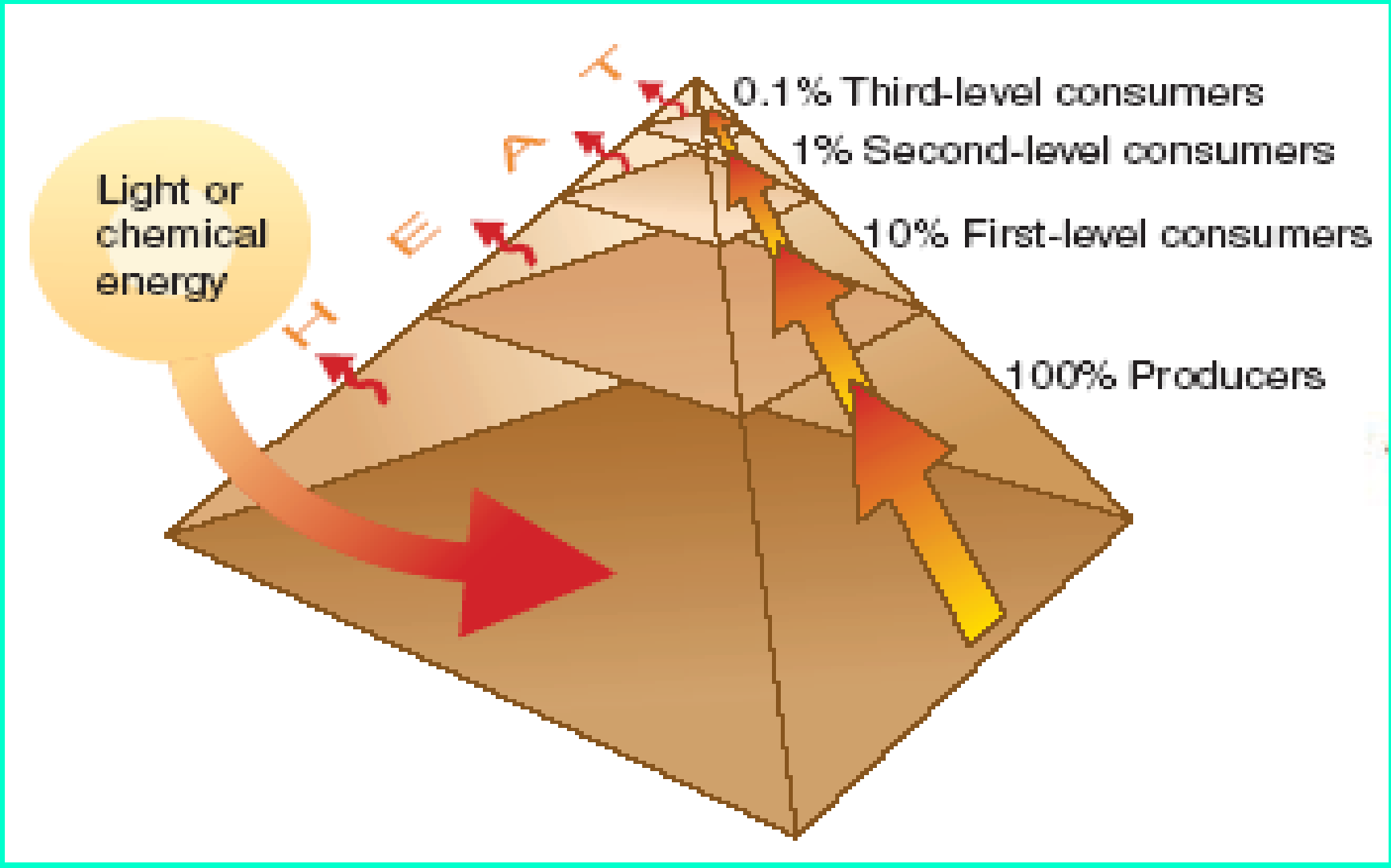
May be:

Energy Pyramid

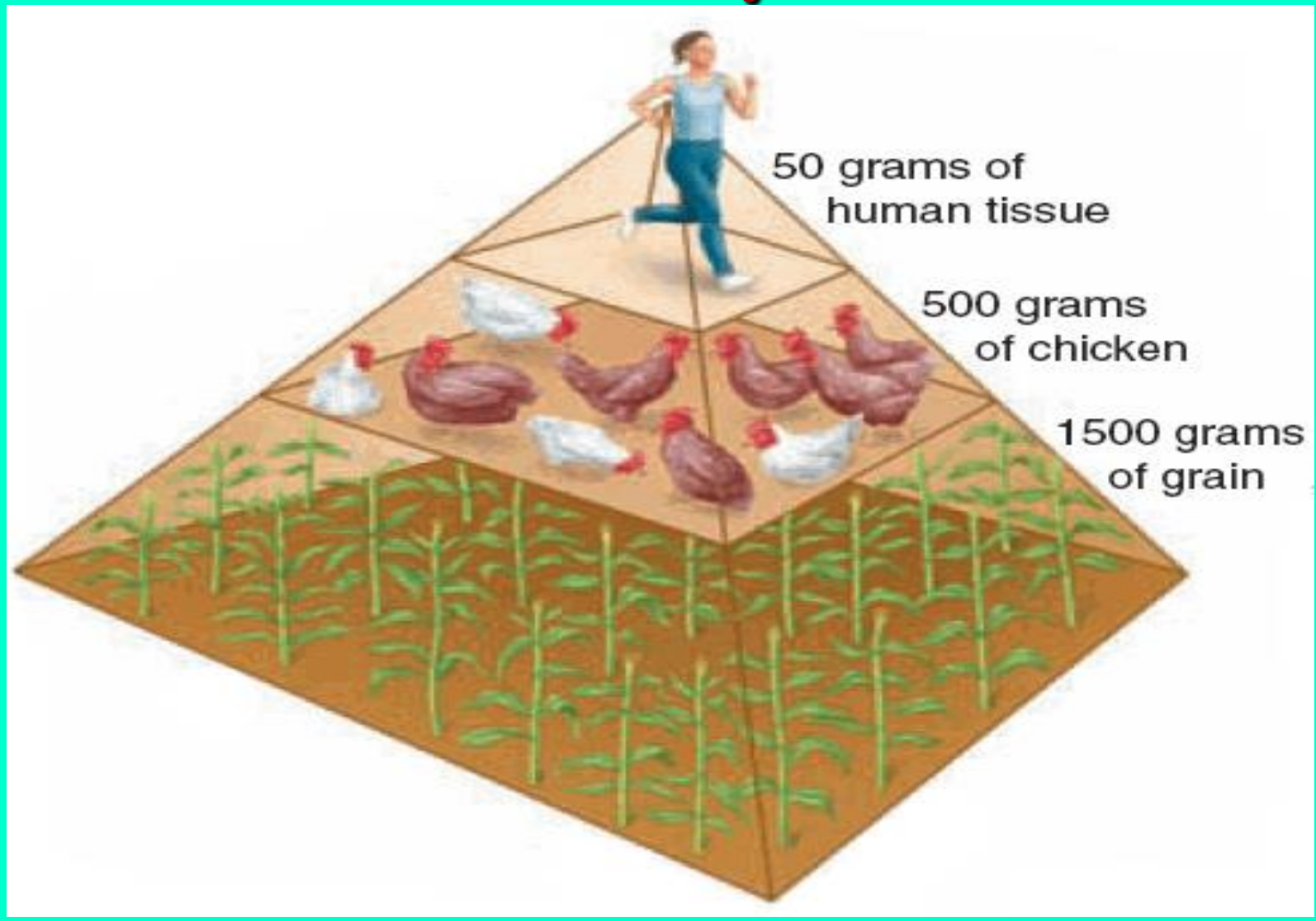
Biomass Pyramid

Pyramid of Numbers

Energy Pyramid



Biomass Pyramid



Pyramid of Numbers

VI. Cycles in Nature

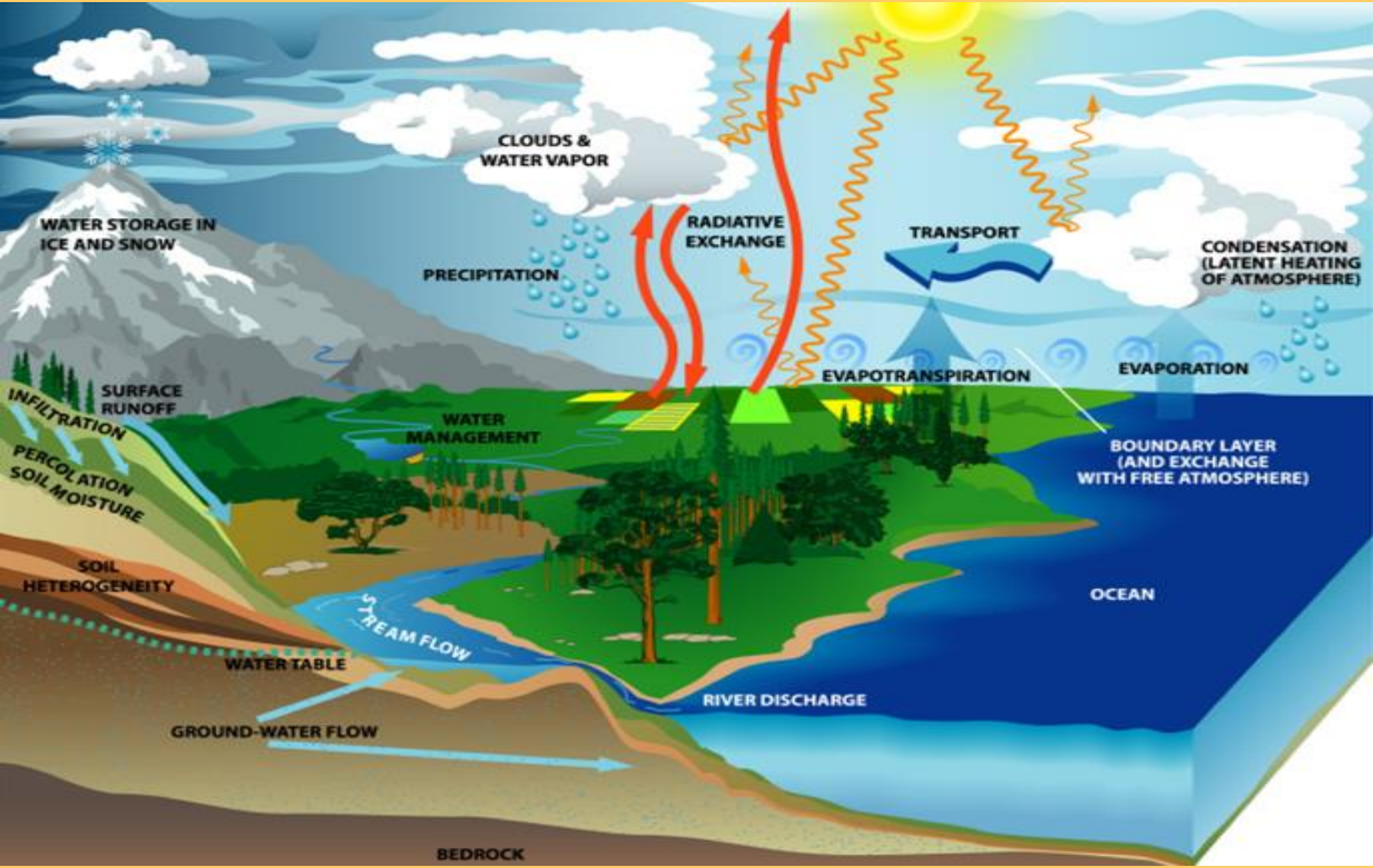
- **Matter is neither created or destroyed it is changed from one form to another**
  - Recycling water, carbon and nitrogen is how life continues

Remember The Lion King!

Water Cycle

- **Driven by solar radiation**
- **Movement of water from one area of Earth to another**
- **Changes form – solid, liquid, gas**

A.Water Cycle

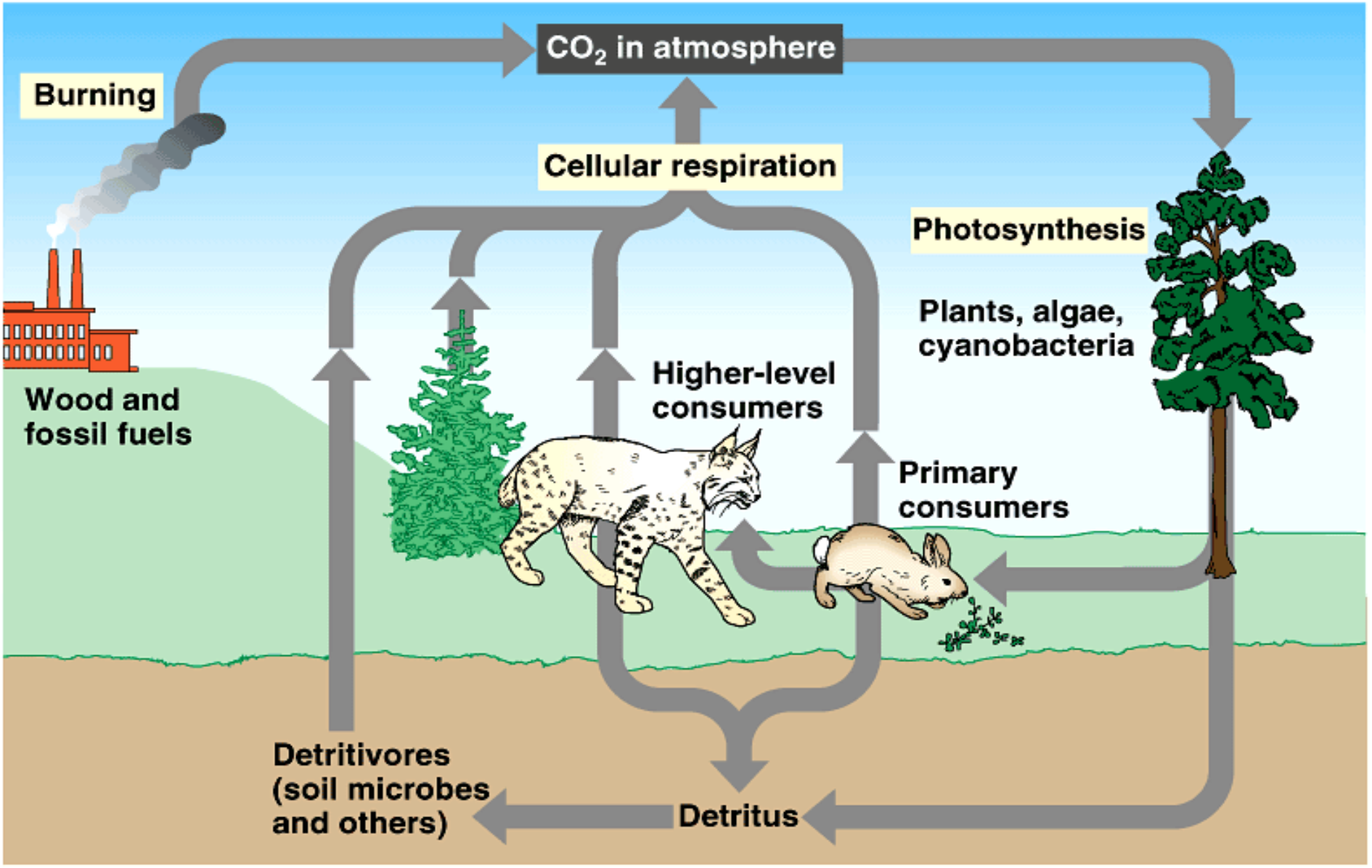


B. Carbon Cycle

- **Autotrophs (plants) take up CO_2 and "fix" it into glucose (photosynthesis)**
  - **Carbon moves from abiotic to biotic**

- **Carbon moves through the food web**
  - **Released as CO_2 during cellular respiration by producers, consumers and decomposers (biotic to abiotic)**

Carbon Cycle



C. Nitrogen Cycle

- **Nitrogen is used for DNA and proteins**
- **N_2 (a gas that organisms can't use) is converted into a usable form by lightning and cyanobacteria**

- **Nitrogen is then incorporated into plant tissue and moves through the food web**
- **Bacteria break down waste and dead organisms to release nitrogen back into a form plants can use**

Nitrogen Cycle