

# Biosphere

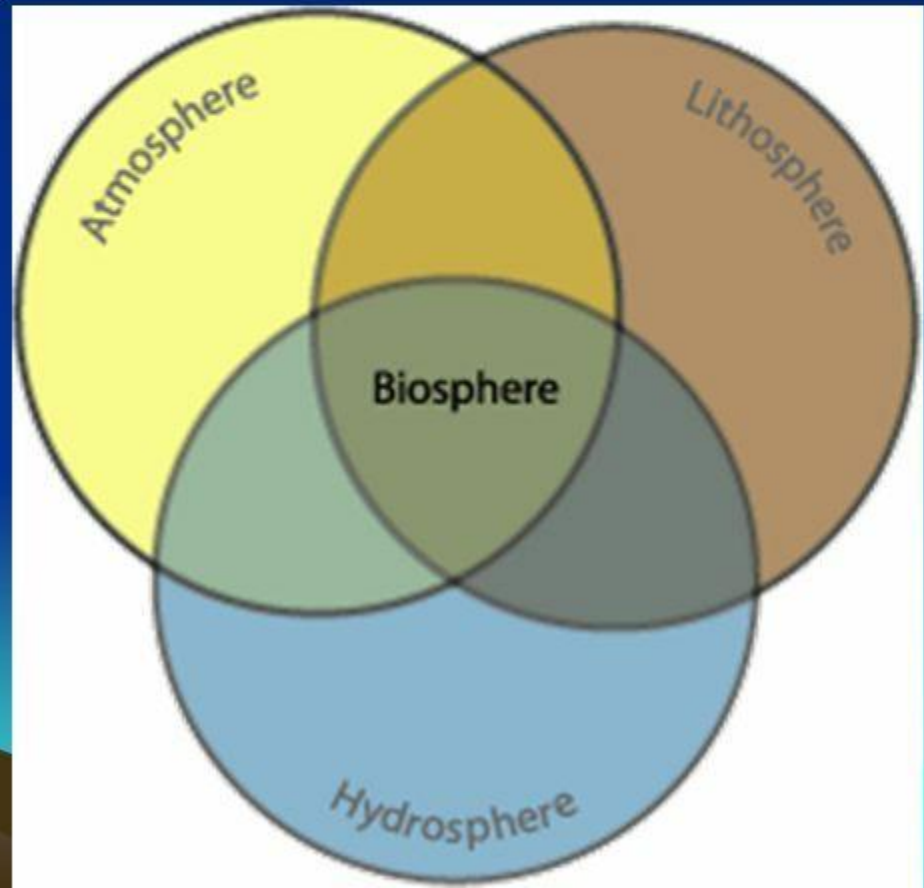
# Section 3-1

What is Ecology?

# Interactions & Interdependence

- Ecology –the study of interactions among orgs. & between orgs. & their env., or surroundings.
- The term *ecology* comes from the Greek word *oikos*, meaning “house”.
- Our world is a household made of many houses.
- The largest of these houses is the **biosphere**.

- **Biosphere** –the part of Earth in which life exists including land, water, & air or the atmosphere.

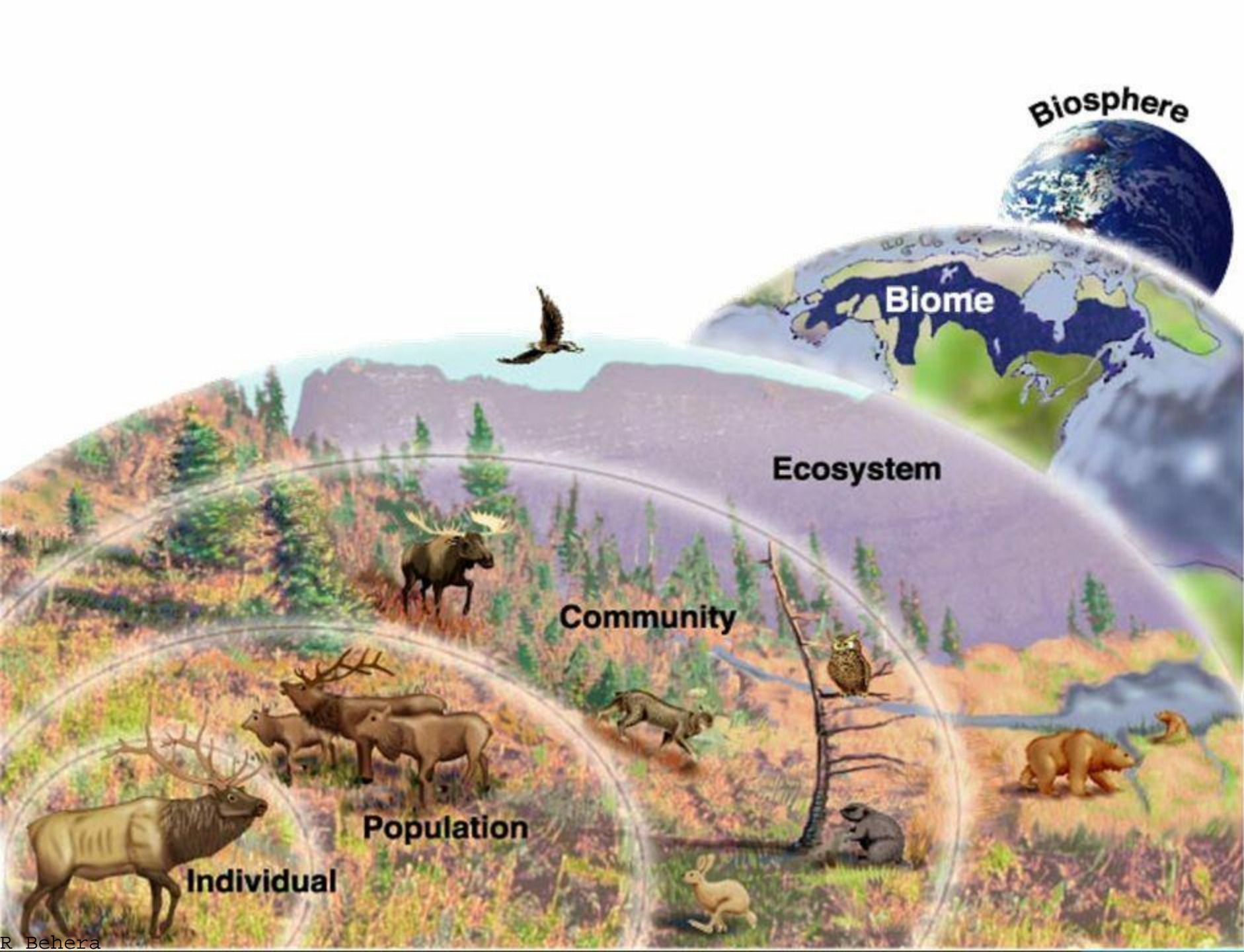


# Levels of Organization

- There are many levels of organization that ecologists study.
- You have:
  - Species
  - Population
  - Community
  - Ecosystem
  - Biome
  - Biosphere

- Species –a group of orgs so similar to one another that they can breed & produce fertile offspring.
- Population –groups of individuals that belong to the same species & live in the same area.
- Communities –groups of different populations that live together in a defined area.

- Ecosystem –a collection of all the orgs. that live in a particular place, together w/ their nonliving or physical, env.
- Teams of ecologists may study larger systems called **biomes**.
- Biomes –a group of ecosystems that have the same climate & similar dominant communities.





- The highest level of organization that ecologists study is the biosphere.

# Section 2

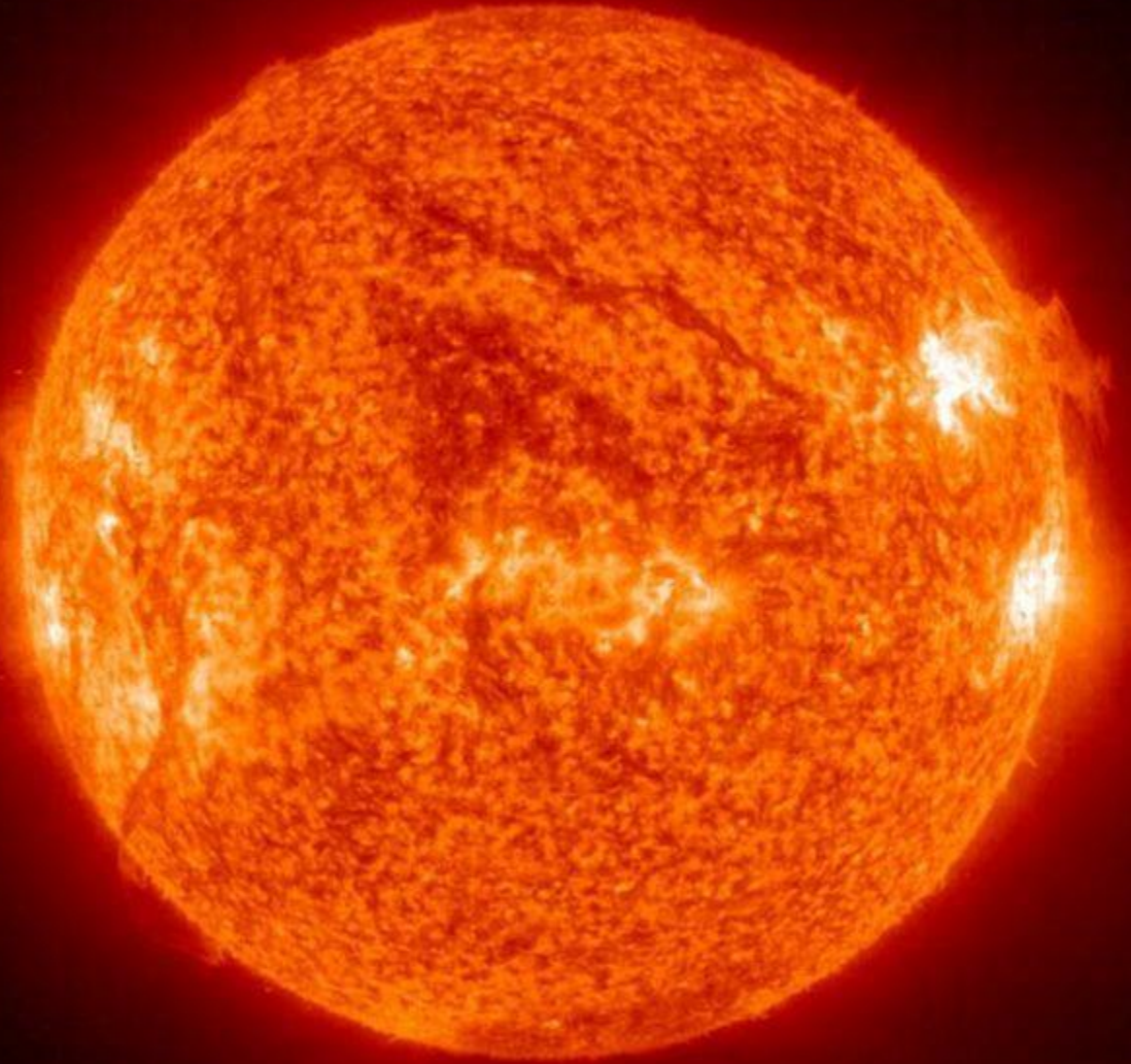
## Energy Flow



# Producers

- Without a constant input of energy, living systems can't function.
- What is the main source of energy for life on Earth?

# The Sun



- Less than 1% of the sun's E gets used by living things.
- In a few ecosystems, some orgs. obtain E from a source **other than sunlight**.
  - Those orgs. rely on E stored in inorganic chemical compounds.

- **Plants, algae, & certain bacteria** capture E from sunlight or chemicals to produce food.
  - They are called autotrophs.
- Autotrophs –orgs. that capture E from sunlight or chemicals & use it to make their own food from inorganic compounds.
  - AKA producers.

- **Producers:**

- Can capture E from the sun or chemical energy.

- **Ex:**

- Plants, algae, some bacteria.

- **Fig. 3-4**

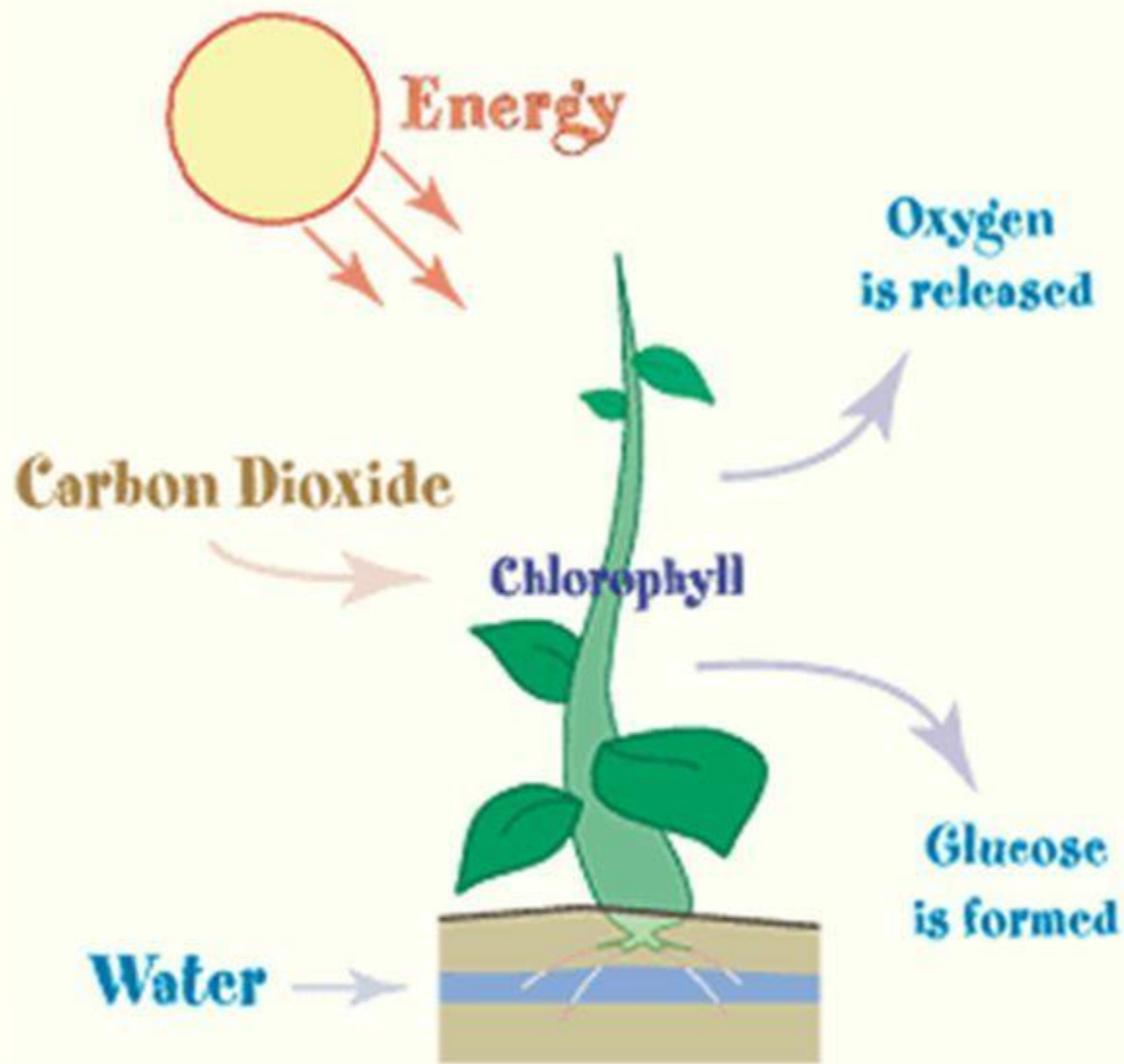
# Produce Section





# Energy from the Sun

- Photosynthesis –process by which plants & some other orgs. use **light E** to convert **H<sub>2</sub>O** & **CO<sub>2</sub>** into **O** & **carbs** such as:
  - starches & sugars
  - Fig. 3-2
- This process takes in CO<sub>2</sub> & releases O<sub>2</sub>.

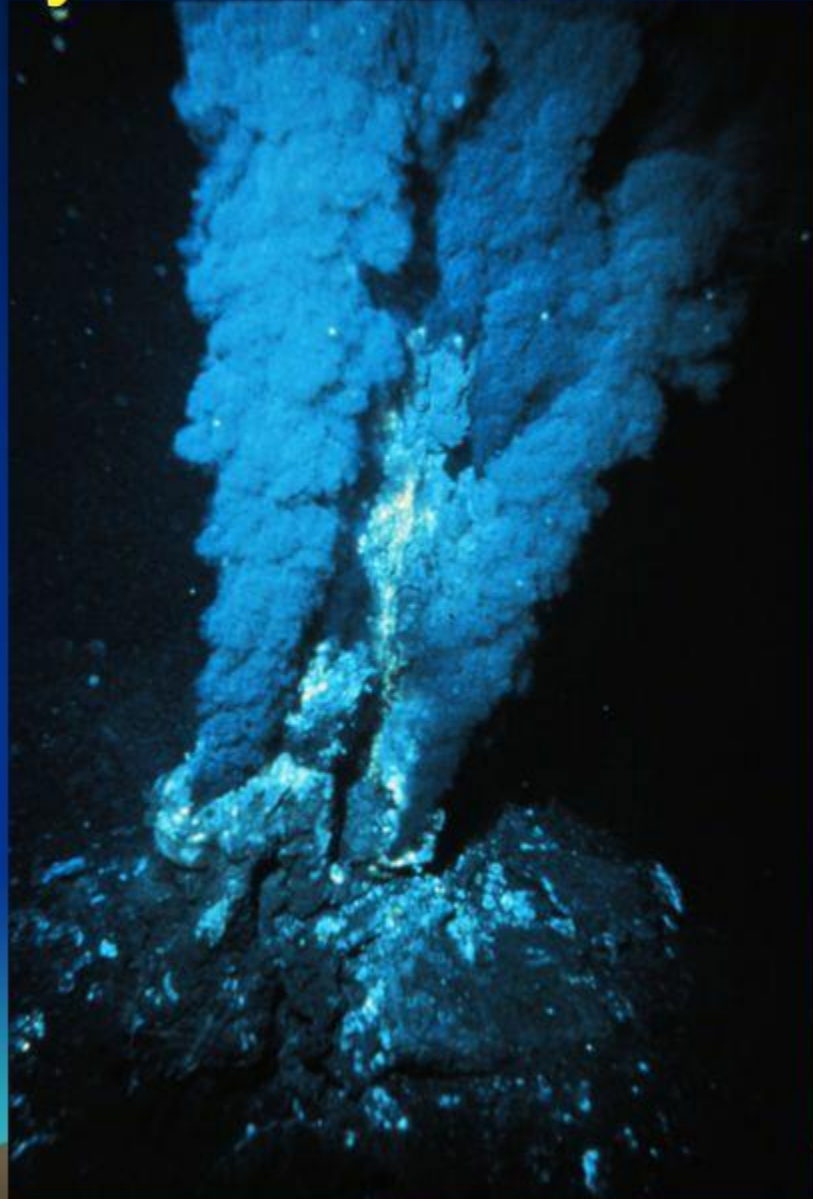


# Photosynthesis

# Life W/out Light

- Some autotrophs can make E w/out sunlight.
- They rely on E held in the chemical bonds found in inorganic molecules.
  - **Ex:** hydrogen sulfide
- This process is called chemosynthesis.

# Hydrothermal Vent



# Bacteria living under glaciers



# Consumers

- Many orgs. Can't harness the sun for E.
  - **Ex:** animals, fungi, & most bacteria
- The only way these orgs. get E is by eating something.
- These orgs. are called heterotrophs.
- Heterotrophs are consumers.

- There are many different types of consumers:
  - **Herbivores**
    - Eat only plants
    - **Ex:** cows, deer, caterpillars
  - **Carnivores**
    - Eat other consumers
    - **Ex:** snakes, dogs, owls
  - **Omnivores**
    - Eat both animals & plants
    - **Ex:** humans, bears, crows
  - **Detritivores**
    - Feed on plant & animal remains & other dead matter, collectively called detritus.
    - **Ex:** mites, earthworms, snails, crabs
  - **Decomposers**
    - Break down organic matter
    - **Ex:** bacteria & fungi

# Feeding Relationships

- Food Chains
- Food webs
- Trophic levels



- Food chain –a series of steps in an ecosystem in which orgs. transfer E by eating & being eaten.

# Food



Quaternary consumers

Carnivore



Tertiary consumers

Carnivore



Secondary consumers

Carnivore



Primary consumers

Herbivore



Primary producers

Plant

A terrestrial food chain



Carnivore



Tertiary consumers

Carnivore



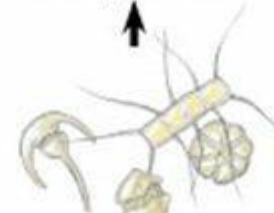
Secondary consumers

Carnivore



Primary consumers

Zooplankton



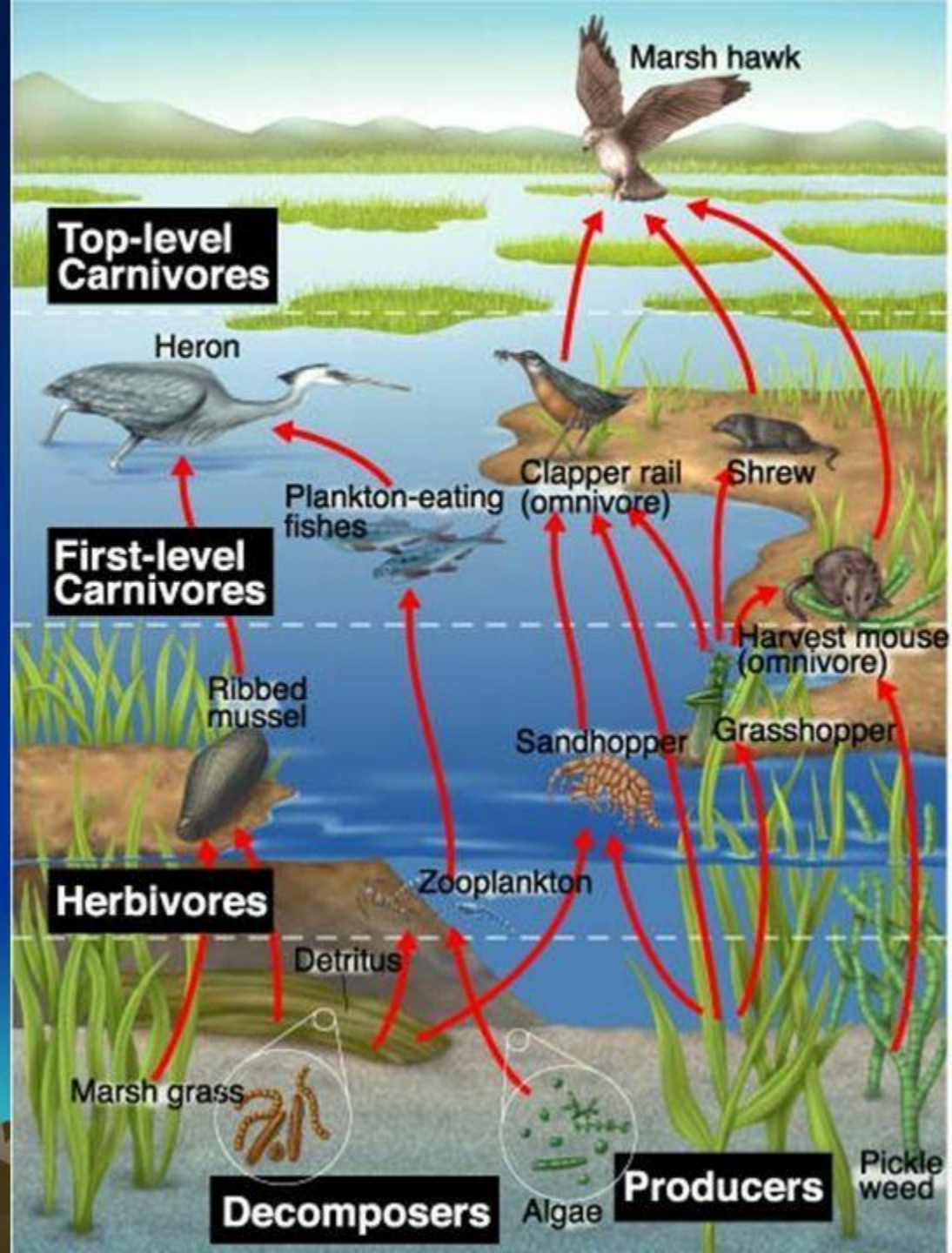
Primary producers

Phytoplankton

A marine food chain

- Food Web – a network of feeding relationships among the various orgs. in an ecosystem.

# Food Web



- Trophic Level –each step in a food web or food chain.
- Producers make up the 1<sup>st</sup> level.
- Consumers make up the higher levels.
- Every consumer depends on the trophic level below it for E.

# Ecological Pyramids

- Ecological pyramid –a diagram that shows the relative amounts of E or matter contained w/in each trophic level.
- 3 types:
  - E pyramid
  - Biomass pyramid
  - Pyramid of numbers

- **E pyramid:**
  - Only about 10% of the E available w/in one trophic level is transferred to orgs in the next level.
  - Much E is lost as heat in the env.

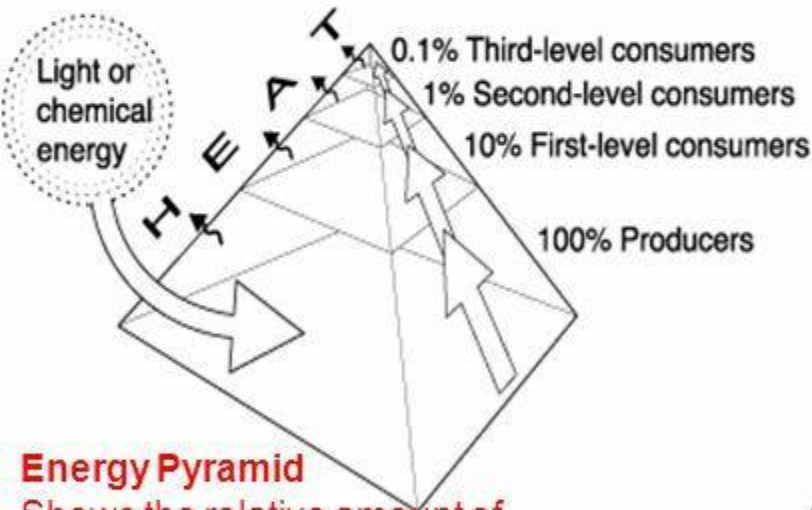
- **Biomass Pyramid:**

- Shows the total amount of living tissue w/in a given trophic level.
- Expressed in terms of **grams of organic matter per unit area.**
- Represents the amount of potential food at each trophic level.



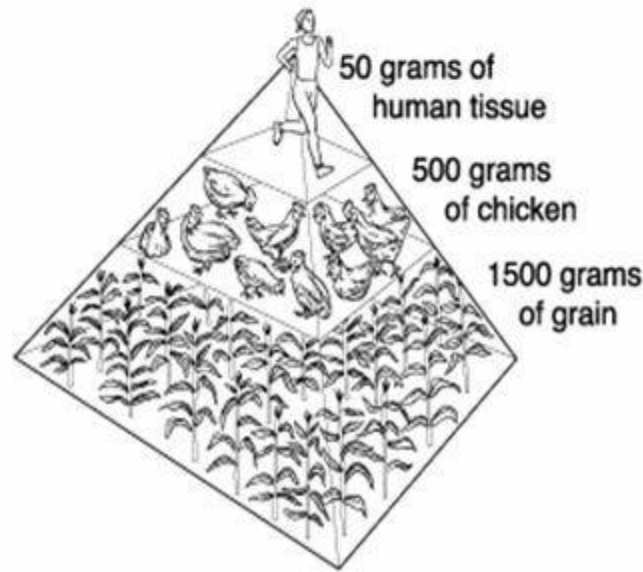
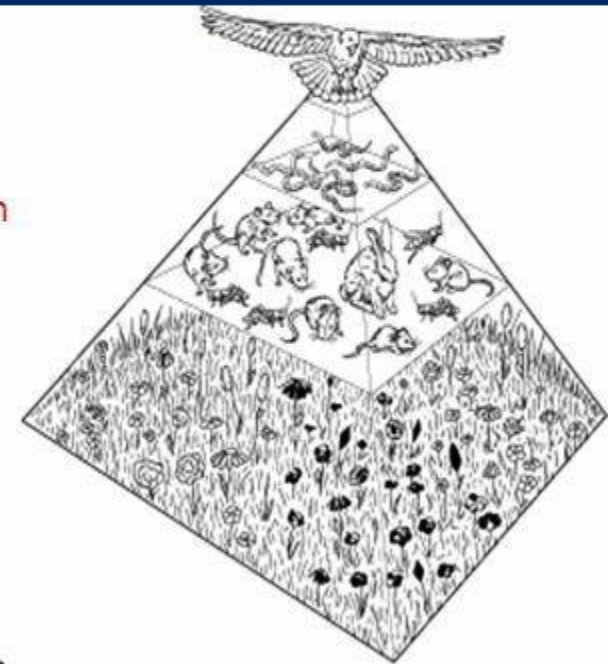
- **Pyramid of Numbers:**
  - Shows us the number of individual orgs at each trophic level.
  - P. 73, fig. 3-9

# Ecological Pyramids



## Biomass Pyramid

Represents the amount of living organic matter at each trophic level. Typically, the greatest biomass is at the base of the pyramid.



## Pyramid of Numbers

Shows the relative number of individual organisms at each trophic level.

## Energy Pyramid

Shows the relative amount of energy available at each trophic level. Organisms use about 10 percent of this energy for life processes. The rest is lost as heat.

# Section 3

## Cycles of Matter



