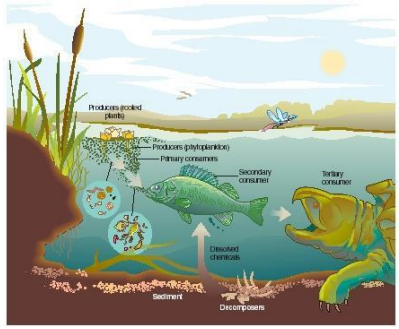
What do you see?



Definition of Ecosystem

- Set of relationships between **biological communities** and the **physical environment**.

Components of an Ecosystem

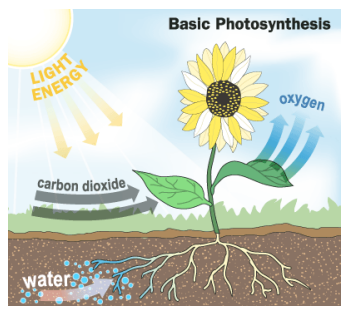
1. Biological community - the biotic factors
   - Ex. Bacteria, plants, animals, humans, fungi, micro-organisms
2. Habitat - abiotic factors
   - ex. Temperature, soil, light intensity, chemicals
3. Transfer of energy
   - Ex. Food chains and food webs
4. Cycling of materials
   - Ex. Water, carbon, oxygen, and nitrogen

Two Types of Organisms

Autotrophs
- Auto= self
- Troph= food; energy
- MAKE THEIR OWN FOOD
- PRODUCERS
- Photosynthesis/ chemosynthesis

Heterotrophs
- Hetero = other
- MUST EAT THEIR FOOD
- CONSUMERS

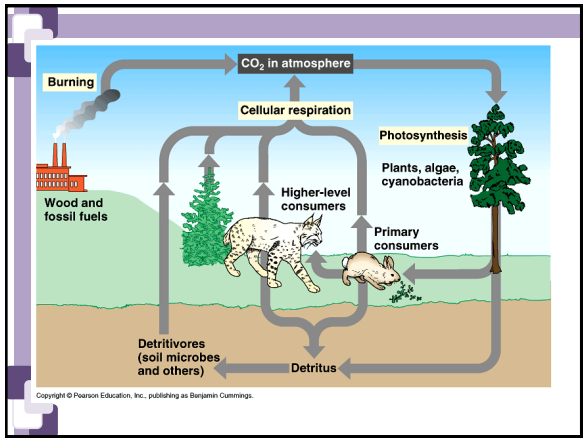
Connection between Autotrophs and Heterotrophs



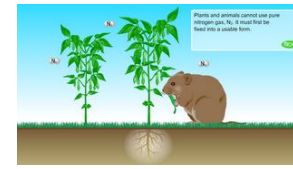
Connection between Autotrophs and Heterotrophs

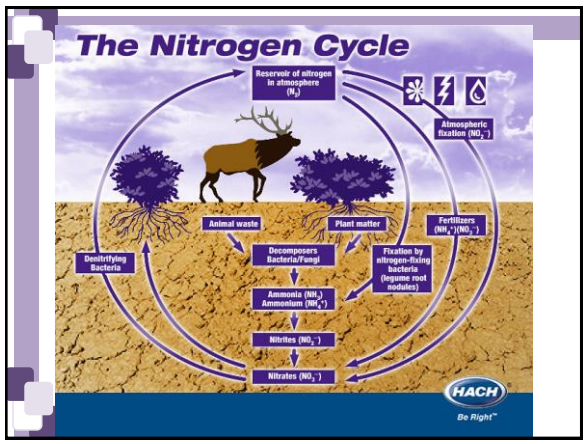
- Autotrophs carry out photosynthesis which makes SUGARS (carbohydrates) and OXYGEN for cellular respiration (all organisms).
- Cellular respiration makes the carbon dioxide (CO_2) that is required for photosynthesis.

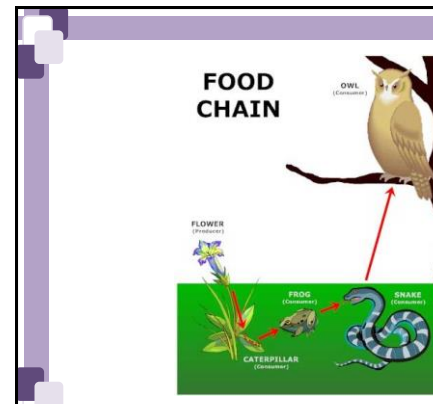
Carbon Cycle



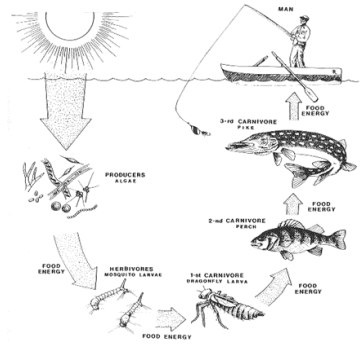
Nitrogen Cycle







Food Chain

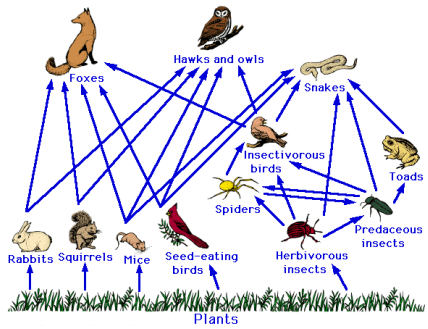


Food Chains

1. Directions of arrows show the DIRECTION IN WHICH ***<u>ENERGY IS TRANSFERRED</u>***.
2. MUST START WITH AUTOTROPH/PRODUCER
3. Decomposers cycle the matter BACK to the producer.

- So what if someone eats from TWO or MORE food chains?

Food Web



How Organisms Obtain Energy

- Producers (autotrophs)
  - Use sun or chemical energy to make food

How Organisms Obtain Energy

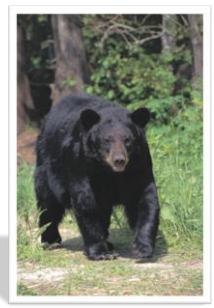
- Consumers (heterotrophs)
  1. Herbivores
     - Feed directly on autotrophs
     - Eat plants only

How Organisms Obtain Energy

- Consumers (heterotrophs)
  2. Carnivores
     - Kill and eat only other heterotrophs
     - Eat animals only

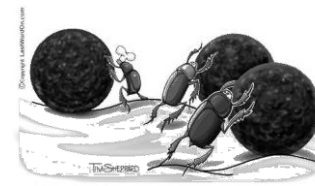
How Organisms Obtain Energy

- Consumers (heterotrophs)
  3. Omnivore
     - Eat both plants (autotrophs) and animals (heterotrophs)



How Organisms Obtain Energy

- Consumers (heterotrophs)
  4. decomposers
     - Consume dead plants and animals, feces, etc



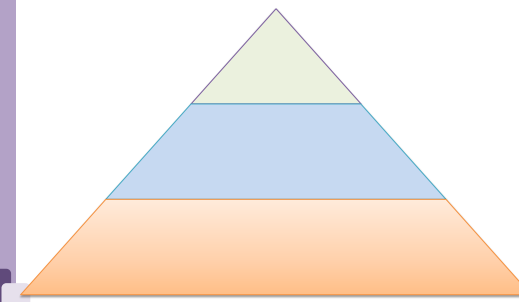
Aloof from the other dung beetles, Jack considered himself something of a gourmet.

Trophic Levels

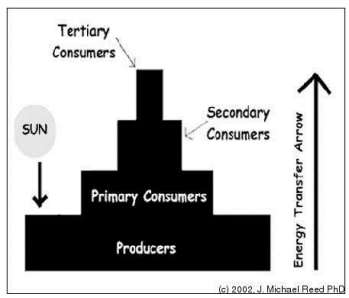
- energy level; feeding level
- Producers→ primary consumers→ secondary consumers→ tertiary consumers→ . . . .

decomposers

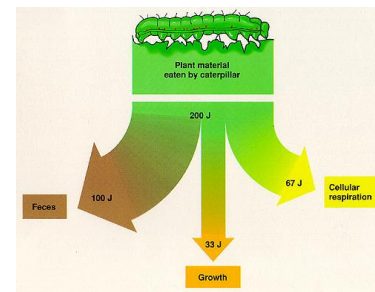
The Pyramid



Why is it a triangle and not a square?



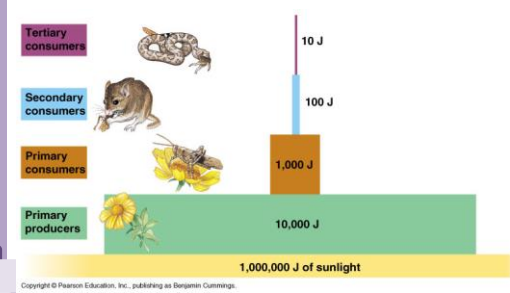
Energy Transfer



Energy Transfer

- Only 10% of the energy is transferred between trophic levels.
- Non-transferrable energy:
  - body heat
  - metabolism
  - growth
  - energy for movement
  - inedible parts - hair, fur, bones

What are the effects of the 10% transfer?



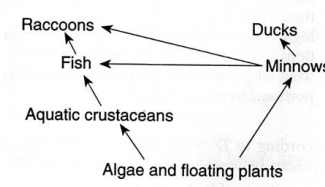
Effects of 10% transfer

- Less energy available for higher trophic levels.
- Less energy means LOWER CARRYING CAPACITY→ SMALLER POPULATION SIZES as you move up the trophic levels.

- **Biomass**- # of organisms in each trophic level

Which organisms would normally be the least numerous in this marine community?

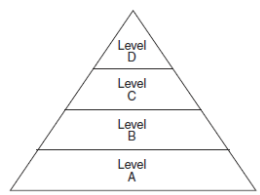
A. Algae
B. Minnows
C. Raccoons
D. Ducks



An energy pyramid is represented below.

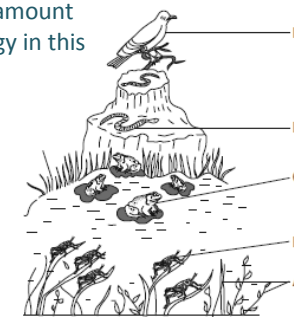
The energy for use by organisms in level *A* originally comes from ___.

A. Producers
B. Level *B*
C. The Sun
D. Level *D*



Which species would have the largest amount of available energy in this ecosystem?

A. A
B. B
C. C
D. E

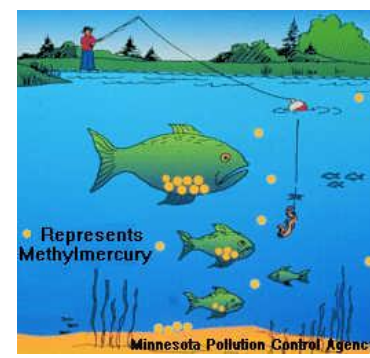


Bioaccumulation

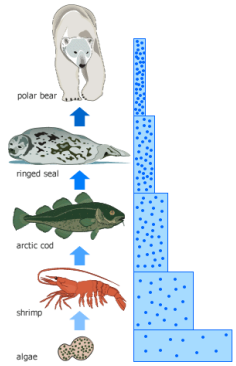
- **Bioaccumulation/biomagnification**
  - toxins that DO NOT BREAK DOWN
  - ex. Lead/mercury

- levels of toxins BUILD UP/INCREASE as you move up the trophic levels…why?

Bioaccumulation



Bioaccumulation



A pesticide is applied to the area. Each species is monitored for pesticide. Which species would have the greatest amount?

A. A
B. B
C. C
D. E