Interactions in Communities

I. Community: A group of populations that occur in a given area.

(Review: Population: a group of organisms of the same species living in a given area.)

II. Competition

A. Define: an interaction between organisms using the same resource, which is often present in limited supplies.

B. List 4 resources that living organisms compete for:
   1. Food
   2. Water
   3. Space
   4. Sunlight

C. What is Gause’s principle of competitive exclusion?
   1. When two species compete for a limited resource, one or the other will be more efficient at utilizing or controlling this resource. The most efficient species will eventually eliminate the other.

   What can happen to the least efficient species?
   a. extinction
   b. adaptation
   c. migrate
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III. Discuss how an ecological niche differs from a habitat?

Niche = organism’s role or function in a community. (It’s “job description”)

Habitat = the surroundings in which the organism lives (Where it lives, it’s “address”)

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IV. Predation
A. Define: When one species seeks out and consumes (kills) another species.
B. Importance of predation on a community.

1. Canyons with mt. lions have:
   a. 47 X more cottonwoods
   b. 5 X more butterflies
   c. 200X more amphibians
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IV. Predation
   C. Co-evolution of predators and prey
      1. Natural defenses in plants:
         a. Spines and thorns
         b. Toxins
         c. Associations with insects

   2. Natural defenses in animals:
      a. Concealment and camouflage.

Adult citrus butterfly  Larvae of citrus butterfly
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IV. Predation
   C. Co-evolution of predators and prey
      2. Natural defenses in animals:
         a. Concealment and camouflage.

Tree hoppers: insects that look like thorns.

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IV. Predation
   C. Co-evolution of predators and prey
      2. Natural defenses in animals:
         a. Concealment and camouflage.

Walking stick
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IV. Predation
   C. Co-evolution of predators and prey
      2. Natural defenses in animals:
         a. Concealment and camouflage.

Deer fawns

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IV. Predation
   C. Co-evolution of predators and prey
      2. Natural defenses in animals:
         a. Concealment and camouflage.

◆ Fox – summer coat
◆ Fox – winter coat
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IV. Predation
   C. Co-evolution of predators and prey
      2. Natural defenses in animals:
         b. Escape in time.
            1) Calves of antelopes
            2) 13 or 17 year cicadas
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IV. Predation
   C. Co-evolution of predators and prey
      2. Natural defenses in animals:
         c. Being obnoxious.

Skunk

Black Monarch Butterfly Larvae

Blue Jay eating Monarch Butterfly

Blue Jay hurling Monarch Butterfly
Interactions in Communities

IV. Predation
   C. Co-evolution of predators and prey
      2. Natural defenses in animals:
         d. Advertising - Mullerian mimicry.
            When obnoxious or harmful organisms mimic each other or exhibit warning colorations.

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IV. Predation
   C. Co-evolution of predators and prey
      2. Natural defenses in animals:
         d. Deception - Batesian mimicry.
            When harmless organisms mimic obnoxious or harmful organisms.
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IV. Predation
   C. Co-evolution of predators and prey
      2. Natural defenses in animals:
         e. Batesian mimicry.
         When harmless organisms mimic obnoxious or harmful organisms.

         Fly mimics a bee
         Moth mimics a hornet

Interactions in Communities

V. Interspecific relations
   - Symbiosis: any intimate association between members of different species.
   A. Parasitism: when one species benefits at the expense of the other.
      1. Tarantula & Pepsis wasp
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- Parasitism - Wolf Spider Wasp

2. Mistletoe and Trees
   a. Hemiparasite: desert mistletoe
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2. Mistletoe and Trees
   a. Hemiparasite: traditional mistletoe
   b. True parasite: dwarf mistletoe in pine.
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3. Cuckoo & other birds: nest parasitism of Warbler by Cuckoo

Cuckoo egg
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3. Cuckoo & other birds: nest parasitism of Warbler by Cuckoo

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4. Humans and Tapeworms
   a. Life cycle of the Beef tapeworm
### Interactions in Communities

#### 4. Humans and Tapeworms

b. Principle parasitic tapeworms in humans.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Life Cycle</th>
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| 1. Beef Tapeworm  | Larva in cow  
                    | Adult in human                                                             |
| 2. Pork Tapeworm  | Larva in hog  
                    | Adult in human                                                             |
| 3. Dog Tapeworm   | Larva in biting dog louse or flea  
                    | Adult in dog, cat, human                                                   |
| 4. Rat Tapeworm   | Larva in earwigs, flour beetles, fleas or other insects  
                    | Adult in rats and human                                                    |
| 5. Dwarf Tapeworm | No host  
                    | Adult in intestine of human                                                |
| 6. Fish Tapeworm  | Two larval stages  
                    | 1. First in crustacean  
                    | 2. Second in fresh water fish  
                    | Adult in humans and other fish eating mammals                             |

#### B. Mutualism – when both species benefit.

1. **Mycorrhiza**
   
a. Pine tree root fungus

b. Tree provides food for fungi.

c. Fungi provides increased root surface area & protects against pathogens.
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B. Mutualism – when both species benefit.

2. Lichens
   a. Fungi provide shelter and protection for algae
   b. Algae provide food for fungi.

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❖ Mutualism – Ants & aphids

❖ Ants protect aphids

❖ Aphids provide ants with food (honeydew).
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- **Mutualism**
  - Yucca Moths

- Moth pollinates yucca.

- Yucca seeds are (only) food source for larvae.

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Interactions in Communities

- **Mutualism**
  - Yucca Moths

- Female moth collecting pollen.
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- **Mutualism - Yucca Seed Pods**
  - larvae exit holes

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**C. Commensalism** — one species benefits & the other is indifferent.

Shark & Pilot fish

- Shark provides food for pilot fish.
- Shark is not harmed and receives nothing in return.
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- **Commensalism - Saguaro & mosquito**
  - Saguaro provides reproductive environment for mosquito.

VI. Intraspecific relations

- Define: interactions within a species (between members of same species)

A. Mating
Interactions in Communities

VI. Intraspecific relations

B. Cannibalism

◆ Consuming a member of the same species on a regular basis.

C. Competition

Define: an interaction between organisms [of the same species] using the same resource, which is often present in limited supplies.
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VI. Intraspecific relations

D. Peck Order

- An interaction between social organisms.
- Rank and file social system.
- Result: a better functioning social structure that better ensures survival of the species.

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VI. Intraspecific relations

E. Territoriality

- Define: when an organism defines & defends an area within its home range against other members of the same species (usually the same sex).

Overlapping home ranges.

Territories within each home range.
Interactions in Communities

VI. Intraspecific relations

E. Territoriality

2. How organisms mark their territory.
   - Vocalizing: frogs, songbirds, elk.
   - Visual: lizards (pushups & color), red-winged blackbird, black bear claw markings.
   - Scent glands.
   - Urine and feces.