

# Community Ecology 2

# The Uncertainty in Studying Species Competition

If there are two species utilize the same resources, do you think the competition should occur?


➤ Unlimited resources

➤ The effect of the environmental conditions (when one species exist in large population while the second species in small population)

# The Uncertainty in Studying Species Competition

- What is the importance of Experimental studies?
- Ex. Seed eating rodents & Kangaroo
- 50\*50 enclosures
- Give another example?

# Caution is Necessary

- **First**
- Negative effect of one species on the another is not necessary indicating to the exist of competition.
- Ex. Similar size fish have negative effect on each other  the adult of one species feed on the juveniles of the other species (different population size).

# Caution is Necessary

- Second
- Feasibility:
- Coyote shows increasing in its population during last years **While** the grey wolf population decrease.
- **so** experimental studies may explain that by competition processes.
- The size and geographical distribution (experimental studies should but them in enclosures and replicates)

# Predation

- It is the consuming of one organism by another.
- The predators have an adverse effect on the prey population.
- Dramatic effect of human by eliminating or adding predators (which giving a good examples of predator effect)
- Eliminating of carnivores from much eastern United States has led to population explosions of white-tailed deer.
- Give another example

# Predation

- Conversely
- Introducing rats, cats and dogs led to eradicate the population size of tortoises because the introduced animals feed on the eggs and young tortoises.
- Give another example

# Predation and Evolution

- Predation cause great pressure on the prey population.

So



Any character that reduce the probability of prey capture is favored.

Therefore:

- Both the predators and their preys have showed immense adaptations to improve and reduce capture respectively. These adaptations are part of evolution process in both sides of equation.
- ***Coevolutionary arms race:*** is defined by the evolving process in which the predators and prey develop different ecological and behavioral mechanisms for capture and defense.



# Animal Defenses

Butterflies feed on milkweed  plant keep cardiac glycosides compounds pass through generations  toxic for the predators such as birds.

1. **Chemical Defenses:** animals produces a wide range of toxic materials as like as plants. Bess, wasps, predatory bugs, scorpions, spider use different chemicals to defense themselves and to kill their prey. Snake, lizards, fishes and birds produce different kinds of venoms and killing materials. Alkaloids compounds which produced by poison-dart frog to kill any predators eats them.
2. **Defensive Coloration:** some insect which on milkweed tree colored to advertise the poisons nature using the ecological strategy called *warning coloration* or *aposematic coloration*.

*Cryptic coloration* is one of the ecological strategy when the animal color blends with the surroundings and thus hides the individual from the predators.

*Camouflaged animals* these animals do not live together in groups because a predator that discover one individual can use it as clue to find the other.

3. **Mimicry**: there are two types of mimic which followed by animal to avoid the predators:

- Batesian mimicry
- Müllerian mimicry

**Please read more about the above subjects**

- The organisms which live together in a community have evolved themselves simultaneously that to adjust and change to one another .
- Such as flowering plants and birds or insects.

**Symbiosis:** is one of the evolution strategy. Arrangement in which two dissimilar organisms live together in what is usually a mutually beneficial manner. In this relationship, the coevolution process happened between the involved organisms, **e.g**, the relation between the fungi (such as mycorrhiza )and plant (roots). The fungi accelerate the plants' absorption of nutrients from the soil, in turn the plant provide the fungi with carbohydrates. As well as the root nodules which contain the bacteria that fix the nitrogen from the atmosphere to be available to the host plants. Please read about more examples (leaf, ants and fungi).

# Symbiosis types

- The most common kinds of symbiosis are:
  1. Commensalism:
  2. Mutualism
  3. Parasitism

## Commensalism:

Is a symbiotic relationship that benefits one species and neither hurts nor helps the other.

e.g. barnacles grow on other animals mostly on the active moving ones such as whales which provides the barnacles with protection, and moving them for another food resources.

# When is commensalism not commensalism?

- In order to decide whether the commensalism is it or is not, we have first to know an adequate evidence about the ecological requirements of each organism that involved in this relation. Otherwise, there is somewhat confusion.
- e.g anemones and fishes
- e.g birds (oxpeckers) & cattle

- **Mutualism:** is a symbiotic relationship among organisms when the both species obtain benefits. This relation is important in determining the biological community structure.
- e.g. birds, insects, bates & flowering plants
- e.g. ants (carry aphids among different plants) & aphids (suck fluid from the phloem of plant and transform it into different materials used by ants)
- **See another examples**

- **What is the confusion about the mutualism?**
- Please answer the question

**Parasitism**: is a special symbiosis relationship. The parasite usually much smaller than prey and always stay closely associated with it. In this relation the parasite get benefit from the prey and cause harmful effects on it which may be in some circumstances cause killing of the host. In general there are two types of parasitism:

1. **External parasite**: which feed on the external surface of the prey and it is called **ectoparasites**. Such as lice and wasp.
2. **Internal parasite** : this kind of parasitism common in vertebrates which parasitized by **endoparasite**, invertebrates also have many parasites that live within their bodies. These kind of parasites characterized by **being extremely specialized**.



# Interaction among Ecological Processes

1- **Predation Reduces Competition:** marine species, intertidal zone.

2- **Parasitism May Counter Competition:**

3- **Indirect Effects:** in some cases there is no direct interaction between species, i.e. indirect effects.

- Key stone species
- Ecological succession may increase the species richness (Succession in animal communities).
- Disturbance
  - All these subjects are your homework