**Other types of interactions**

1. **Positive indirect effects**
   1. **Trophic cascade:** benefits alternate between tropic levels

**-**Killer whale, sea otter example **(Estes et al. 1998)**

1. **Commensalism:** species interactions where one species benefits, the other is unaffected

-often structural or support based

ex. barnacles on whales

ex. scavengers following predators

1. **Mutualism:** positive species interactions where both species benefit

\*Very common, and sometimes species pairs are highly specialized (co-evolved symbiosis)

* 1. **Trophic:** complementary acquisition of resources

-Examples: mychorrhizae and plants

* 1. **Defensive:** one species provides a protective function in return for energy/nutrients

**-**Examples: anemone fish and anemone

ant – acacia

* 1. **Dispersive:** organisms receive energy in exchange for dispersing gametes/propagules (pollen, fruit, seeds)

-Examples: fruit and frugivores

orchid bees and orchids

**One mechanism that can produce mutualisms (there are others):**

**Coevolution (see classic paper by Ehrlich and Raven 1964):** Evolutionary change in a trait of species A in response to a trait in species B

**-Primarily driven by tight species associations**

-Specific (particular traits) and reciprocal (between both species)

-Can be either antagonistic or mutualistic: can manifest as evolutionary “arms races”