

## Species, Population, & Community Level Interactions (M)

Communities are built and controlled by the many ways species that live in the same habitat compete for resources. These interactions drive adaptations, and ultimately evolution of, all members of that community. Below is a list of different types of interactions and adaptations:

1 (species level)	2 (interaction category)	3 (type of competition)	4 (type of defense)
Intraspecific (within the same species)	Competition (competes for a resource)	Competitive Exclusion (competition forces one species out)	Mullerian Mimicry (2 poisonous species evolve to mimic one another)
Interspecific (between 2 different species)	Predation (hunts another organism)	Resource Partitioning (organisms use different parts of a resource so both use it)	Batesian Mimicry (harmless species evolves to copy a poisonous one)
	Parasitism (feeds off a host slowly but doesn't kill)	Competition*	Camouflage (color that blends into environment)
	Mutualism (both organisms involved benefit)		Startle Coloration (striking coloration that startles predators)
	Commensalism (one organism benefits, one is unharmed)		Warning Coloration (says "I'm poisonous" to predators)
			Chemical Protections (either tastes terrible, causes nausea, or is poisonous)

\*Intraspecific competition for resources, e.g., wolves of same population competing over a kill.

**Directions: For the following descriptions, identify the interactions and adaptations that are occurring. Note whether each of the organisms is harmed ( - ), benefitted ( + ), or is unaffected ( O ) by the interaction.**

1. Jewel wasps ( ) lay their eggs in the body of a cockroach ( ) to ensure reproductive success. These little wasps have developed potent venom that allows the female to immobilize a cockroach in order to implant her eggs in its body cavity. As the larvae develop, they feed on the internal organs of the cockroach, slowly killing it, until mature and ready to burst out of the roach carcass. *Video can be seen on class website.*

**Interaction Type (column 1):** \_\_\_\_\_

**Jewel Wasp/Cockroach Interspecific Interaction (column 2):** \_\_\_\_\_

2. Bats ( ) and barn swallows ( ) often compete for resources in the same habitat. Both species rely on flying insects such as moths and gnats as their main source of food. However, bats are active during nighttime and swallows active during daylight.

**Interaction Type (column 1):** \_\_\_\_\_

**Bat/Barn Swallow Interspecific Interaction (column 2):** \_\_\_\_\_

3. Barnacles ( ) are sedentary animals that often attach themselves to moving objects such as whales ( ). These hitchhikers are able to vastly broaden their feeding ground without impeding the whale in any way.

**Interaction Type (column 1):** \_\_\_\_\_

**Barnacle/Whale Interspecific Interaction (column 2):** \_\_\_\_\_

4. Malaria is an insidious disease that has long plagued many African countries. The disease is caused by a microscopic Protist species ( ) that invades the red blood cells of its victim and steals nutrients from the host animal ( ). Malaria is transmitted by a mosquito.

**Interaction Type (column 1):** \_\_\_\_\_

**Malaria parasite/Host Interspecific Interaction (column 2):** \_\_\_\_\_

6. Farmers rely on bees ( ) to pollinate many of their crops such as almonds, apples and berries ( ). In fact, many species of plants rely solely on honey bees to complete their reproductive cycle and develop the fruit we put on our plates every day. Just as these plants rely on honey bees to reproduce, many bees only feed on the nectar and pollen of a particular species of plant.

**Interaction Type (column 1):** \_\_\_\_\_

**Honey Bee/Pollinated Plant Interspecific Interaction (column 2):** \_\_\_\_\_

**Population or Community level:** \_\_\_\_\_

7. The yellow and black striped coloring of a honey bee ( ) identifies this organism as a venomous species to would-be predators. The hoverfly ( ) also has this coloration but unlike the honey bee has not venomous stinger.

**Interaction Type (column 1):** \_\_\_\_\_

**Honey Bee Adaptation (column 4):** \_\_\_\_\_

**Hoverfly Adaptation (column 4):** \_\_\_\_\_

**Population or Community level:**

8. Clown fish ( ) and sea anemones ( ) form a relationship where the clown fish use the sea anemone for food and protection from predators. Clown fish can hide safely in the poisonous anemone tentacles to which they have developed a resistance. In turn, the clown feed on bacteria growing on the tentacles, which are harmful to the sea anemone.

**Interaction Type (column 1):** \_\_\_\_\_

**Clown Fish/Sea Anemone Interspecific Interaction (column 2):** \_\_\_\_\_

**Population or Community level:** \_\_\_\_\_

9. Zebra mussels ( ) are an invasive species that has dominated the Great Lakes since they were unintentionally introduced by humans the 1980s. They are voracious filter feeders and breed very rapidly. They feed on microorganisms that are a main food source for native fish ( ) living in the lakes. Some of these native fish are being pushed to the brink of extinction because of their limited ability to compete for resources.

**Interaction Type (column 1):** \_\_\_\_\_

**Zebra Mussels/ Native Fish Interspecific Interaction (column 2):** \_\_\_\_\_

**Population or Community level:** \_\_\_\_\_

10. Octopi are fascinating little creatures that biologists often suggest have the highest capacity for intelligence of the animal kingdom, aside from primates. Many species of octopus ( ) have the capability to instantaneously flash bright colors when they feel threatened and secrete a noxious ink to deter would-be predators ( ).

**Interaction Type (column 1):** \_\_\_\_\_

**Octopus/Would-be Predator Interspecific Interaction (column 2):** \_\_\_\_\_

**Octopus Prey Adaptations (2) (column 4):** \_\_\_\_\_

**Population or Community level:** \_\_\_\_\_

11. The Viceroy butterfly ( ) is toxic due to the accumulation of salicylic acid in its body from the caterpillar stage feeding on members of the willow family. The Viceroy butterfly is colored similarly to the Monarch butterfly to advertise its toxic status to would-be predators ( ).

**Interaction Type (column 1):** \_\_\_\_\_

**Viceroy Butterfly/Predator Interspecific Interaction (column 2):** \_\_\_\_\_

**Monarch-Viceroy Prey Adaptation (column 4):** \_\_\_\_\_

**Population or Community level:** \_\_\_\_\_

12. Mountain goats ( ) introduced into Olympic National Park have reduced the number of native alpine wildflowers ( ) in the park in areas where they forage for food.

**Interaction Type (column 1):** \_\_\_\_\_

**Mountain Goat/Alpine Wildflower Interspecific Interaction (column 2):** \_\_\_\_\_

**Population or Community level:** \_\_\_\_\_

**Intraspecific** – between two individual of the same species (ie: between 2 monk parakeets)

**Interspecific** – between two different species (ie: between a zebra and an oxpecker)

**Competition** – competition for resources, either biotic or abiotic

**Predation** – one species preying on another for food where the predator benefits and the prey is negatively affected

**Parasitism** – interaction in which one species takes advantage of a host for the resources to survive, and benefits, but the host is harmed (can be internal or external parasite)

**Mutualism** – interaction in which both species involved benefits

**Commensalism** – interaction in which one species benefit and a second is unharmed/unaffected.

**Symbiosis** - associations between two or more species that live together. There are 3 types of symbiotic associations. Those are mutualism, commensalism and parasitism.

**Competitive exclusion** – one species outcompetes another until that species is excluded (cannot access) from the resource

**Resource partitioning** – the resource is broken up into different elements, different species use different parts of the resource

**Contest competition** – competition when the food resource can be monopolized (owned) by one species

**Scramble competition** – competition when the food resource is unable to be monopolized (owned) by one species

Predator-prey adaptations

**Mullerian mimicry** - where two or more distasteful or dangerous animal species resemble each other. This is most common among insects such as wasps and bees (hymenoptera).

**Batesian mimicry** - where an edible species resembles a distasteful or dangerous species. This is most common in insects such as butterflies. A familiar example is the resemblance of harmless hoverflies (which have no sting) to bees.

**Camouflage** – evolve coloration to blend in with the environment

**Startle coloration** – coloration that shocks the predator so it sees a potentially larger species

**Warning coloration** – a bold, distinctive pattern of color characteristic of a poisonous or unpalatable organism, as the skunk or the monarch butterfly that functions as a warning to and defense against predators.

**Chemical protection** – production of chemicals that make the organism taste badly or have toxic effects to the predator. This is common in plants like tobacco, the nicotine is a natural insecticide to deter insects from eating it.