

# Examples of Symbiotic Relationships

## Mutualism +/+

Clownfish & anemone  
Acacia trees & ants  
Hippo & barbel fish  
Capuchin monkeys & flowering tree

## Commensalism +/-

Remora & sea turtles  
Burdock & black bears  
Poison dart frog & leafy plants  
Arctic fox & reindeer

## Amensalism -/0

Bacteria & penicillin  
Weeds & sunflowers  
Ants & elephants  
Insects & cattle

## Parasitism +/-

Sacculina barnacle & crabs  
Cowbird & sparrows  
Mosquito & humans  
Wasp & caterpillars

## Predation +/-

Sea otter & octopus  
Bald eagle & osprey  
Arctic fox & lemmings  
Alligators & turtles

## Competition -/-

Sea sponge & coral  
Coyote & rattlesnake  
Woodpeckers & squirrels  
Rubber tree & rubber tree

# MUTUALISM (+/+)

## Symbiosis that is beneficial to both organisms

### **Clownfish & anemone**

Clownfish provide anemone nutrients from its waste, and anemone provides shelter for clownfish.

### **Acacia trees & ants**

Acacia tree provides food and shelter to ant colony, while ants defend tree against herbivores.

### **Hippo & barbel fish**

Barbel fish eat parasite, food bits and small animals that come near a hippo's mouth. This keeps hippo clean and healthy.

### **Capuchin monkeys & flowering tree**

Capuchin monkeys feeds on nectar from trees and gets pollen on its face. The pollen eventually transfers to other flowers to help with pollination.

# COMMENSALISM(+/0)

Symbiosis that is beneficial to one organism and neither benefits or harms the other

## **Remora & sea turtles**

Remora fish can ride on a sea turtle's back, and it will also eat any discarded food from the sea turtle's mouth.

## **Arctic fox & reindeer**

Reindeer dig in the tundra floor to find grass/lichen. This usually exposes subnivean mammals and insects that help to feed the Arctic fox.

## **Burdock & black bears**

Burdock burrs will stick to a bear's fur. When the burr eventually falls off, the burr germinate in a new area.

## **Poison dart frog & leafy plants**

The poison dart frog finds shelter and camouflage in the leafy plants.

# AMENSALISM (-/0)

**Symbiosis that is harmful to one organism and neither benefits or harms the other**

## **Bacteria & penicillin**

The mould *Penicillium* creates the secretion known as penicillin, which is extremely toxic to bacteria. This finding formed the basis for the first true antibiotic – called penicillin.

## **Weeds & sunflowers**

Sunflowers contain toxins in their roots, leaves, and seeds that prevents weeds from growing.

## **Ants & elephants**

Elephants step on ant hills as they graze. Ants are killed or their colonies are destroyed.

## **Insects & cattle**

Cattle graze on land causing insects to swarm. Birds then will eat those insects.

# PARASITISM (+/-)

**Symbiosis that is beneficial to one organism and harms the other**

## **Sacculina barnacle & crabs**

Sacculina is a species of barnacle that infects crabs and then manipulates their behavior to benefit itself—all to the detriment of the unsuspecting crab

## **Cowbird & sparrows**

Cowbirds lay eggs in the nests of other birds. These "foster parents", called hosts, usually raise cowbird young at the expense of their own eggs or young.

## **Mosquito & humans**

Mosquitoes drink human blood, which causes humans to get itchy and can even get them sick.

## **Wasp & caterpillars**

Wasps possess obligate mutualistic viruses called "polydnaviruses." Along with eggs, wasps inject polydnavirus inside their caterpillar hosts where the hatching larvae develop inside the caterpillar, eventually killing it.

# **PREDATION (+/-)**

**Symbiosis that occurs when one organism is hunted and eaten by another organism**

**Sea otter & octopus**

Sea otters eat octopus.

**Bald eagle & osprey**

Bald eagles eat osprey.

**Arctic fox & lemmings**

Arctic fox eat lemmings.

**Alligators & turtles**

Alligators eat turtles.

# **COMPETITION (-/-)**

**Symbiosis that occurs when two organisms strive for the same resources at the same place and same time**

**Sea sponge & coral**

Compete for space to grow

**Coyote & rattlesnake**

Compete for food

**Woodpeckers & squirrels**

Compete for space for habitats

**Rubber tree & rubber tree**

Compete for resources