

Symbiosis Bingo

Objective

- To provide students with an understanding of what symbiotic relationships are and why it is beneficial for organisms to participate in these relationships
- To explain the difference between the three types of symbiotic relationships: Mutualism, Commensalism, and Parasitism
- To explore the dynamics of some specific marine symbiotic relationships

Background Lesson

Symbiosis is a long term interaction between two species in which at least one species benefits from the interaction. Animals' lives are a constant struggle of competing for food and territory while at the same time shielding themselves from the threats of predators. Symbiotic relationships aid animals in one or several of these struggles to give them a better chance at survival.

Symbiotic relationships can be divided into three categories.

Mutualism: When both species benefit from the relationship.

Commensalism: When one species benefits from the relationship while the other remains unaffected.

Parasitism: When one species benefits from the relationship and the other is harmed.

Symbiotic relationships may be either *obligate* where the relationship is essential for the survival of one of the organisms involved, or *facultative* where the relationship is beneficial but not essential for either organism. Aquatic ecosystems provide many examples of each of these types of symbiotic relationships.

The Game

The following are 24 partnerships between symbiotic species and a brief description of how ecological benefits arise from the relationship. To create a unique bingo card, students will take each species from the list in Column A and arrange them into the 24 squares on the bingo card template. Column B species will be placed in a hat and mixed thoroughly. When a Column B species is drawn from the hat, students must match up this species to its symbiotic partner on their bingo card and place a marker on that square. The first student to get 5 selected species in a row (diagonally, horizontally, or vertically) will win the game.

Species A	Species B	Description
Goby Fish	Shrimp	The shrimp is an extremely good digger and can maintain a burrow in the ocean floor in which to live. The shrimp, however, is nearly blind. Since eyesight is extremely important in the wild, the shrimp pairs up with the goby fish which serves as its set of eyes warning it when there is danger. In exchange, the shrimp provides the goby with a home allowing it to live within its burrow.
Clownfish	Sea Anemone	The clownfish, with a protective mucus coating, can hide in the dangerous sea anemone without being injured. This offers protection for the clownfish who, in exchange, cleans algae from the anemone and provides better water circulation to the anemone by swimming about.
Honey Bee	Flowers	Flowers need to disperse their pollen in order to reproduce in new areas. The bee unintentionally helps in this process by carrying around pollen that was brushed onto the bee while he was drinking the sweet nectar from the flower. The bee then uses this nectar to make honey.
Neon Green Gecko	Trochetia blackburniana Plant	In areas with relatively low invertebrate populations, lizard species are able to expand their diet to include fruits and nectar. When geckos go in search of nectar, they unintentionally pollinate seed from the Trochetia blackburnia plant. The gecko gets food and the plant gets an opportunity to spread its seed.
Anglerfish	Bioluminescent Bacteria	Anglerfish house special bioluminescent bacteria in a special cavity in their bodies. This relationship provides the bacteria with a home and provides the anglerfish with an opportunity to attract prey by the glowing of the bacteria.
Rhinoceros	Oxpecker Bird	The oxpecker bird provides the rhinoceros a cleaning service by eating ticks and parasites off its back. From this the oxpecker gets food and the rhinoceros enjoys the luxury of the tick removal. Also, when the oxpecker senses a predator it will fly high into the air and issue a screaming warning. This helps the rhino know when danger is coming.
Whale	Barnacle	Only the barnacles benefit from this relationship. They get a ride on the whale's back to other areas of the ocean, while also getting an opportunity to filter feed as debris drifts by.
Turtle	Algae	This relationship shows commensalism because the algae benefits from getting a free ride on the sea turtle and the turtle is unaffected by the relationship.
Eagle Ray	Jack	Eagle rays use their powerful jaws to open the shells of conchs and other shellfish. While the ray is

		digging for food, the jack will follow it around and scoop up any small fish that come out from under the sand as a result.
Shark	Remora	The shark is neither helped nor harmed in this relationship but the remora, while suctioned onto the shark's body, is able to catch food scraps and gain protection from predators.
Ratel	African Honeyguide	The African Honeyguide is extremely talented at finding bee hives full of honey. Unfortunately for the bird, it is too small to enter into the nest. It relies on the Ratel, a badger-like mammal, to tear the nest open. Both animals then reap the rewards.
Snail	Blood Fluke	The blood fluke is a parasite that lives and feeds off its host, the snail. Once a blood fluke reaches maturity, it must find a host in order to survive.
Shepherd Fish	Man-o-War Jellyfish	The man-o-war is a jellyfish with stinging tentacles. For protection, the shepherd fish swims among these tentacles and can feed off of them. This provides food and protection for the shepherd fish, and the presence of this fish near the jellyfish attracts food that the jellyfish itself can feed on.
Cleaner Shrimp	Moray Eel	The cleaner shrimp is often found in the Moray Eel's mouth cleaning up parasites and obtaining food from the process.
Pig	Tapeworm	The tapeworm is a long, flat parasite that lives in the intestine of animals such as pigs, cows and humans. This gives the tapeworm a safe, warm home and a constant food supply at the expense of the host.
Egyptian Plover	Nile Crocodile	As the crocodile eats, many remnants from its meal become lodged in its sharp teeth and began to break down, damaging the teeth. The Egyptian Plover is extremely willing to help the crocodile with this problem by going in and eating the remains from the crocodile's teeth. The bird gets lunch and the crocodile gets a flawless smile.
Bass	Wrasse Fish	The little wrasse fish obtain food by cleaning parasites and unhealthy flesh off of the bass. This way the wrasse gets food and the bass gets a good clean.
Hawaiian Bobtail Squid	Vibrio fischeri	Vibrio fischeri live in a special light organ in the squid's body. They are fed by the squid in exchange for matching the squid's amount of light the squid emits to the amount of light coming from the surface as a form of camouflage.
Decorator Crab	Sponge	The decorator crab, as its name suggests, takes pieces of sponge from around the ocean floor and attaches it to its back. This provides the crab with a disguise and the sponge with a mode of

		transportation that it did not have before.
Ostrich	Zebra	The ostrich has extremely poor hearing and sense of smell while the zebra excels in these categories. In this way, the ostrich can be warned when danger can be smelt or heard. The ostrich returns the favour with its extremely good sense of sight. If the ostrich sees danger it warns the zebra to get away.
Crab	Urchin	The sea urchin has a very effective defensive design with its razor sharp and sometimes venomous spines, but no ability for locomotion to come into contact for food. The crab has locomotion and by placing an urchin on its back the crab can also take advantage of the urchin's defense mechanism.
Guenon Monkey	Hornbill	In this relationship, only the hornbill benefits. As Guenon monkeys climb trees in search of fruit, insects, moths and beetles fall from the trees. The hornbill then scoops up its easy meal and remains close to the Guenon for more.
Rufous Woodpecker	Black Tree Ants	The black tree ants are normally hostile animals but for some reason allow the Rufous woodpecker to lay its eggs close to the nest. Only the woodpecker benefits from this relationship having its eggs well protected from danger by the ants.
Human	Intestinal Bacteria	Inside the digestive tract of humans live many bacteria that help to break down the food we eat into its nutrients. This is a symbiotic relationship. Humans require the bacteria to obtain nutrients and the bacteria use the human digestive tract to get food and have a home.

One Fish at a Time