

Unpack the Standard:

Students will categorize relationships between organisms that are competitive or mutually beneficial.

Competition Among Organisms

Competition occurs when organisms of the same or different species attempt to use an ecological source in the same place at the same time.

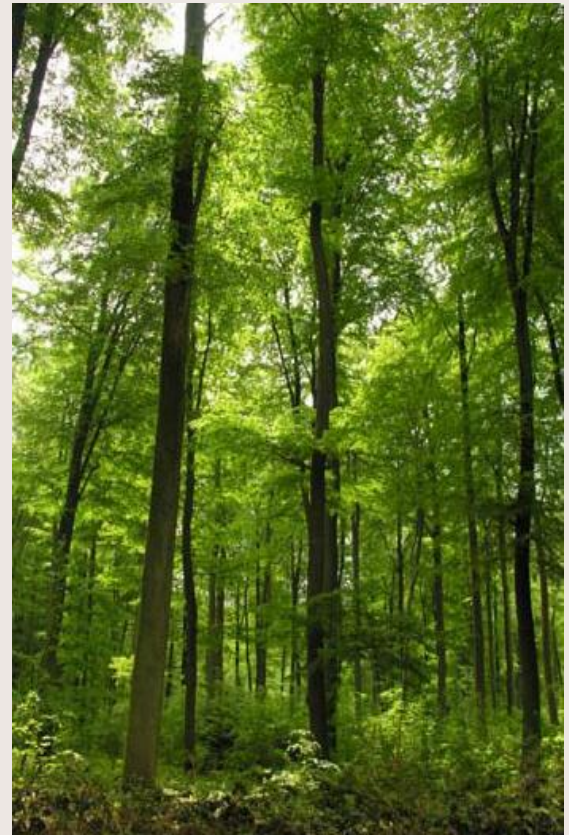


Benjamin
Cummings

Competition Among Organisms

Green plants cannot survive for very long without sunlight and they become unhealthy if they do not obtain minerals and water. When plants are growing close together, in a forest for example, the tallest plants will receive most sunlight. The smaller plants will receive less sunlight because the taller plants shade them from the sun's rays.

Ecologists say that all of the plants in the forest are in competition with each other; they are competing for the sunlight. In a dense forest, many seedlings which germinated in the spring may not survive the winter because they did not receive enough sunlight to make and store food.



Competition Among Organisms

Herbivores which eat the same part of a plant, seed-eating birds for example, are in competition with each other. If there are too many primary consumers they will eat too many plants. If the number of plants is reduced this will eventually mean that some animals will starve. To avoid competing with each other, herbivores specialize by eating different plants or different parts of the same plants.

An ecosystem depends on a balance, sometimes called the balance of nature, which only provides for a certain number of organisms to survive within it.

SYMBIOSIS

There is great diversity and interdependence of living things.

Many species are interdependent through relationships of SYMBIOSIS.





Definition:

Symbiosis exists when organisms of two or more different species live in close association with each other for the benefit of one or both.

The “code”

Use the following code to “score” how each organism is affected by its interactions with the other organism in the relationship:

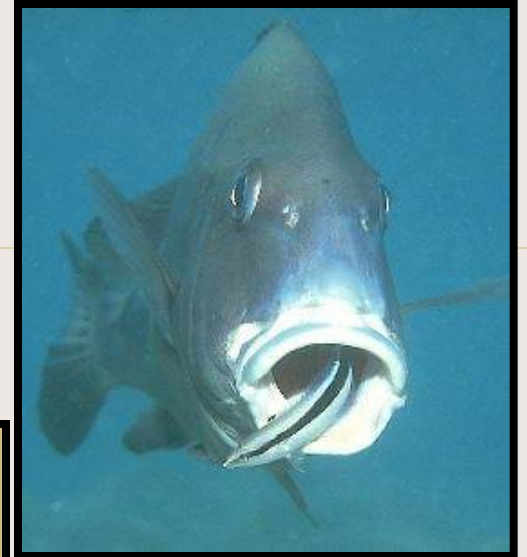
| | |
|----------------------|---|
| + PLUS | the organism is better off because of the interaction |
| -- MINUS | the organism is hurt by the interaction |
| 0 ZERO | the organism is neither helped nor harmed by the relationship |
| “RIP” DEAD | the organism is killed by the other organism |

The combinations

The following combinations are most likely to occur in nature:

+ +
PLUS-PLUS

Both organisms are better off because of their relationship with each other.



The wrasse is eating parasites from the other fish's mouth.... both fish get a "plus."



This is a symbiotic relationship known as **MUTUALISM**.

The butterfly gets nectar to eat... the flower gets pollen carried to another flower... plus-plus!

The combinations

| | |
|-------------------|--|
| + + | MUTUALISM (symbiotic) |
| + - PLUS-MINUS | One organism benefits by doing harm to its host, the other organism. |

This is a symbiotic relationship known as **PARASITISM**.



The tick, the flea, and the mosquito get their food by taking it from a living host... plus for the parasite, minus for the host.

The combinations

| | |
|------------------|--|
| + + | MUTUALISM (SYMBIOTIC) |
| + -- | PARASITISM (SYMBIOTIC) |
| + 0 PLUS-ZERO | One organism benefits without helping or harming the other organism. |

This is a symbiotic relationship known as **COMMENSALISM**.

The tree provides a place for the airplant to live... the airplant does nothing for the tree but does not hurt the tree, either. Plus-zero.



The combinations

| | |
|---------------------------|---|
| + + | MUTUALISM (SYMBIOTIC) |
| + - | PARASITISM (SYMBIOTIC) |
| + 0 | COMMENSALISM (SYMBIOTIC) |
| + RIP PLUS-DEAD | One organism benefits by killing and eating the other organism. |



Plus for the cheetah...
RIP for the gazelle.

This relationship is called PREDATION.

It is not symbiotic because one organism dies as a result of the relationship.

The combinations

| | |
|------------------|---|
| + + | MUTUALISM (SYMBIOTIC) |
| + - | PARASITISM (SYMBIOTIC) |
| + 0 | COMMENSALISM (SYMBIOTIC) |
| + RIP | PREDATION (NOT SYMBIOTIC) |
| 0 0 ZERO-ZERO | Two organisms live side by side with no significant impact on each other. |

This relationship has no name.

It is not symbiotic because no organism benefits as a result of the relationship.

This relationship probably occurs very often, but it is not very interesting. We won't spend time analyzing zero-zero relationships.

Case history #1: the Lichen

An algae and a fungus live together in a form known as a LICHEN. The algae cells are imbedded in the fungus, so the lichen looks and functions like a single living thing.



The algae can do photosynthesis, but it cannot store water.

The fungus cannot feed itself, but it is good at storing water.



Their life together works out well, because the algae provides food for both and the fungus stores water for both.



How should you score the algae... +, --, 0, or RIP?

How should you score the fungus... +, --, 0, or RIP?

What kind of relationship exists within the lichen?

M. Mutualism PA. Parasitism C. Commensalism PR. Predation

Is the relationship symbiotic? Yes or No

Case history #2: the Fox and the Grape

Foxes need food. Grape plants need a way to move seeds to distant locations.

The fox eats and swallows the grape. The skin and pulp of the grape digest in the fox's stomach, giving him nourishment. The seed passes through undigested.



The grape plant has no way to move its seeds to new locations, but by putting the seeds inside a grape, the plant makes it worthwhile for the fox to eat the grape.

When the fox excretes, the seed comes out, wrapped in fertilizer, as far away from the parent plant as the fox traveled after eating the grape.

How should you score the fox... +, --, 0, or RIP?

How should you score the grape plant... +, --, 0, or RIP?

What kind of relationship exists between the fox and the grape plant?

M. Mutualism PA. Parasitism C. Commensalism PR. Predation

Is the relationship symbiotic? Yes or No

Case history #3: the Resurrection Fern and the Oak Tree

Oak trees are tall. Resurrection ferns need a place to grow high out of the shade of the lower forest. Resurrection ferns grow on the bark of oak tree branches.

The resurrection fern has shallow roots that do not penetrate through the oak tree bark. The fern takes no sap from the tree. It gathers its own water from the rain, fertilizer from wind-blown debris, and sunlight from above.

The oak tree is very strong. It has no problem carrying the weight of the ferns, and the ferns do not block the sun from reaching the leaves of the oak.



How should you score the resurrection fern... +, --, 0, or RIP?

How should you score the oak tree... +, --, 0, or RIP?

What kind of relationship exists between the fern and the tree?

M. Mutualism PA. Parasitism C. Commensalism PR. Predation

Is the relationship symbiotic? Yes or No

Case history #4: Honey Guide and Honey Badger



The Honey Guide is a bird that likes to eat bees' wax.
The Honey Badger is a small mammal that likes to eat honey.

The Honey Badger has short legs, and is not good at finding bee hives. His thick fur protects him from the stings of the bees.



The Honey Guide flies through the forest and has sharp eyes that make it easy to find bee hives. When he finds a hive, he goes looking for a Honey Badger. Then he "guides" the Honey Badger to the bee hive. The Honey Badger tears open the hive and eats the honey... and the Honey Guide waits. When things have settled down, the bird eats the bees' wax that has been tossed on the ground by the Honey Badger.

How should you score the Honey Guide... +, --, 0, or RIP?

How should you score the Honey Badger... +, --, 0, or RIP?

What kind of relationship exists between the Honey Guide and Honey Badger?

M. Mutualism PA. Parasitism C. Commensalism PR. Predation

Is the relationship symbiotic? Yes or No

Case history #5: the Sea Cucumber and the Pearl Fish



The Sea Cucumber is a sausage-shaped relative of a starfish. It crawls slowly on the sand, eating bits of algae and dead materials it finds at the ocean floor.

The Pearl Fish is a tiny, nocturnal fish with very small fins and very slippery skin. It is not very fast or strong, and it is very vulnerable to predators.

When predators come near, the Pearl Fish swims into the rear end of the Sea Cucumber. The fish hides safely inside its host.

The Pearl Fish does not eat any part of the Sea Cucumber, and the Sea Cucumber does not seem to be bothered in any way by the Pearl Fish.

How should you score the Sea Cucumber... +, --, 0, or RIP?

How should you score the Pearl Fish... +, --, 0, or RIP?

What kind of relationship exists between the Sea Cucumber and Pearl Fish?

M. Mutualism PA. Parasitism C. Commensalism PR. Predation

Is the relationship symbiotic? Yes or No

Case history #6: the Shark and the Remora



Sharks are huge ocean predators that often have Remoras clinging to their skin. The Remora is a long thin fish that uses an area on its back to “sucker” onto a Shark.

The Remora takes no blood from the shark, and eats only the scraps of food that the shark did not want. It is safe from enemies, because who wants to go near a Shark to catch a Remora?

The Shark is not weighed down by the Remora, but it is not helped either.

How did you score the Shark... +, --, 0, or RIP?

How did you score the Remora ... +, --, 0, or RIP?

What kind of relationship exists between the Remora and the Shark?

M. Mutualism PA. Parasitism C. Commensalism PR. Predation

Recently, Remoras have been observed eating parasites from the skin of the Shark, freeing the Shark from these unwanted pests.

NOW, how do you score the Shark... +, --, 0, or RIP?

How do you score the Remora ... +, --, 0, or RIP?

NOW, what kind of relationship exists between the Shark and the Remora?

M. Mutualism PA. Parasitism C. Commensalism PR. Predation

Is the relationship symbiotic? Yes or No

Case history #7: the Squirrel and the Oak Tree

Squirrels nest in Oak Trees, hide in Oak Trees, and eat acorns which are the seeds of Oak Trees. Squirrels eat what they want, and then bury many acorns to eat another day.



Oak trees reproduce by acorns. If the acorns lie on the ground, they are quickly eaten by blue jays, turkeys, doves, and insects. The only acorns that grow to become Oak Trees are the ones that get buried below the surface of the soil.

Squirrels do not end up eating all the acorns they bury, because they forget where they put two-thirds of them. The acorns they don't find are the ones that end up growing into oak trees. Without squirrels, Oak trees would lose ALL their acorns, and none of them would ever become trees.



How should you score the Squirrel... +, --, 0, or RIP?

How should you score the Oak Tree ... +, --, 0, or RIP?

What kind of relationship exists between the Squirrel and the Oak Tree?

M. Mutualism PA. Parasitism C. Commensalism PR. Predation

Is the relationship symbiotic? Yes or No

Case history #8: the Sea Anemone and the Clown Fish



Sea Anemones are related to jellyfish. They have stinging cells they use to paralyze their food. Animals that touch them are injured and sometimes killed.

Clown Fish find protection by living inside Sea Anemones. They are not stung by the Sea Anemone because they cover themselves with the slime from the Anemone. The Clown Fish now tastes the same as the Anemone, so the Anemone thinks the Clown Fish is part of its own body and does not sting it.

Sometimes, the Clown Fish brings home the small animals it catches, and the Sea Anemone uses the leftovers as food.

How should you score the Sea Anemone... +, --, 0, or RIP?

How should you score the Clown Fish ... +, --, 0, or RIP?

What kind of relationship exists between the Sea Anemone and Clown Fish?

M. Mutualism PA. Parasitism C. Commensalism PR. Predation

Is the relationship symbiotic? Yes or No

Case history #9 the Lamprey and the Mackerel

A lamprey is a jawless fish that lives in the surface waters of the ocean. A Mackerel is an ocean fish that can swim fast and dive fairly deep.



The Lamprey attaches itself to the side of a Mackerel, rasps a hole into the side of the fish, and sucks its blood.

The mackerel reacts to the Lamprey by diving into water too deep and cold for the Lamprey. This forces the Lamprey to let go and swim back to the surface.

The Mackerel gradually heals its wound.

How should you score the Lamprey... +, --, 0, or RIP?

How should you score the Mackerel... +, --, 0, or RIP?

What kind of relationship exists between the Lamprey and the Mackerel?
M. Mutualism PA. Parasitism C. Commensalism PR. Predation

Is the relationship symbiotic? Yes or No

Case history #10: the Lamprey and the Lake Trout



Lampreys have found ways to swim from the ocean to the Great Lakes. Lake Trout live in the Great Lakes. Lampreys obtain food by going after Lake Trout.

The Lamprey attaches itself to the side of a Lake Trout, rasps a hole into the side of the fish, and sucks its blood.

The Lake Trout does not have the instinct to dive deep when attacked by a Lamprey. The Lamprey sucks blood until the Lake Trout dies.

How should you score the Lamprey... +, --, 0, or RIP?

How should you score the Lake Trout... +, --, 0, or RIP?

What kind of relationship exists between the Lamprey and the Lake Trout?
M. Mutualism PA. Parasitism C. Commensalism PR. Predation

Is the relationship symbiotic? Yes or No