



11: SYMBIOSIS

Grade Level: 6-8

Time: 45 min- 1 hour

SUMMARY:

In this lesson, students learn about different types of symbiotic relationships between organisms and how those relationships benefit, have no effect on, or negatively affect certain organisms. Using the NAMEPA symbiosis cards, students will explore different symbiotic relationships between organisms and have to match their organism to its symbiont.

Note: there are enough cards for 24 students.

OBJECTIVES:

Students will:

- Learn about symbiosis and different relationships between organisms by participating in an activity.
- Discuss the role these relationships play in ecosystem health.

STEM APPLICATIONS:

- **Science (Ecology)** – students learn about symbiotic relationships between organisms living in the ocean.

NGSS ALIGNMENT:

- **Practice 1.** Asking Questions and Defining Problems
 - **6-8** - Ask questions to clarify and/or refine a model, an explanation, or an engineering problem.
 - **6-8** - Ask questions that require sufficient and appropriate empirical evidence to answer.
- **Practice 3.** Planning and Carrying Out Investigations
 - **6-8** - Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.
- **Practice 4.** Analyzing and Interpreting Data
 - **6-8** - Use graphical displays (e.g. maps, charts, graphs, and/or tables) of large data sets to identify temporal and spatial relationships.
 - **6-8** - Analyze and interpret data to provide evidence for phenomena.

VOCABULARY:

Biodiversity – The variety of life in the world or in a particular habitat or ecosystem.

Ecosystem – A community of living things, non-living elements, and their interrelationships.

Symbiosis – An interaction between organisms living in close physical association.

Mutualism – A relationship between organisms that is beneficial for both organisms.

Commensalism – A relationship between organisms where one organism benefits and the other is neither benefited nor harmed.

Parasitism – A relationship between organisms where one organism benefits and the other is harmed.

MATERIALS:

- NAMEPA Symbiosis Cards (one for every student)
- White board or chalkboard

BACKGROUND:

Ecosystems are extremely complex systems that are made up of interrelationships between species and their environments. If organisms have a symbiotic relationship, it means they live in close physical association with one another. In many cases, symbiotic relationships are imperative to an organism's survival. There are a variety of types of symbiotic relationships. The three discussed in this lesson are mutualism, commensalism and parasitism.



ACTIVITY:

1. Engage/Elicit

Begin the activity by asking the students what an ecosystem is. After taking answers, explain to them that an ecosystem is “a community of living things, non-living things and their interrelationships.” Ask the students what types of relationships organisms have with each other. Answers may include predator-prey, parent and offspring, etc. If they have some difficulty with the question, prompt them by asking if there are some organisms that live near or on each other? How do they interact with one other? The term “symbiosis” may be unfamiliar to the students, so shift the discussion in that direction by providing an example, i.e. a crocodile and Plover Bird. They have a symbiotic, mutualistic relationship, meaning they both benefit from each other. The Plover eats parasites and leftover food in the crocodile’s mouth. The bird gets food, while the crocodile gets its mouth cleaned. Mutualists can be described as “teammates,” commensalists as “neighbors,” and parasites as “thieves.” You may want to write these terms on the board.

2. Explore

After going over each of the terms, shuffle the Symbiosis Cards and give one to each student (if there is an odd number of students, give yourself a card, ensuring everyone has a symbiont). Once everyone has a card, explain to the students that someone else in the class has a symbiotic relationship with them, and that they should find their “symbiont” by talking to other group members about what their organism has or needs. If students think they have found their symbiont, have them check that it is correct and then write their organisms on the board with a circle around it.

3. Explain

Once all of the pairs are written on the board, have students talk in pairs or small groups about what type of symbiotic relationship they believe those organisms have. Is it mutualism, commensalism or parasitism? To assist them, the descriptions on each card can be read aloud to the class. To take this further, students can even create their own examples of symbiotic relationships with made up organisms and share them with their peers.

4. Evaluate/Wrap-up

After determining what type of symbiotic relationship each of the students have with their symbiont, initiate a discussion about symbiosis and ecosystems. For example, you may ask:

- What could happen to an organism if its “symbiont” went extinct?
- How do you think symbiotic relationships affect the health of an ecosystem?
- What do you think are some characteristics of healthier ecosystems?

It is important to stress that if one organism is threatened or endangered, it can directly (and indirectly) affect the presence of many other organisms in that ecosystem. All species in an ecosystem are connected, and maintaining those relationships is crucial

to the sustainability of that ecosystem. Generally speaking, healthy ecosystems will have a greater variety of organisms, or biodiversity.

5. Dive Deeper

NOAA’s Coral Reef Conservation Program is a great resource to research and understand the immense value of coral reef ecosystems to the health of our oceans and our planet as a whole. Visit NOAA’s website to learn more about they symbiotic relationship between coral and the microscopic organisms, zooxanthella, that help them survive: www.coralreef.noaa.gov/aboutcorals/coral101/symbioticalgae/.

To learn more about marine organisms and ecosystems, visit www.namepa.net/education.

ANSWER LIST:

Anemone & Clownfish (mutualism) -

Clownfish is protected by anemone and receives food scraps, anemone is defended from predators and parasites

Barnacle & Whale (commensalism) - Barnacle latches onto whale and benefits when whales swim into plankton-rich waters to feed

Whale Shark & Remora (commensalism) - Remora travels with shark & eats scraps, shark is unaffected

Spider Crab & Algae (mutualism) - Algae lives on crab’s back, helping crab blend into environment

Cleaner Shrimp & Grouper (mutualism) - Cleaner shrimp consumes organisms and parasites in grouper’s mouth

Shrimp & Bubble Coral (commensalism) - Shrimp uses bubble coral for camouflage and protection in coral crevices

Fish Lice & Salmon (parasitism) - Fish serves as host for lice

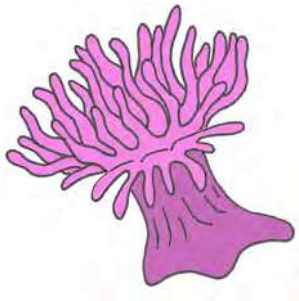
Crab & Sea Urchin (commensalism) - Crab holds sea urchin and uses it for protection

Sea Lamprey & herring (parasitism) - Sea lamprey attaches to host, feeding on it

Blind Shrimp & Goby (mutualism) - Shrimp gets protection from Goby who keeps an eye on predators, Goby uses shrimp’s burrow for protection from predators

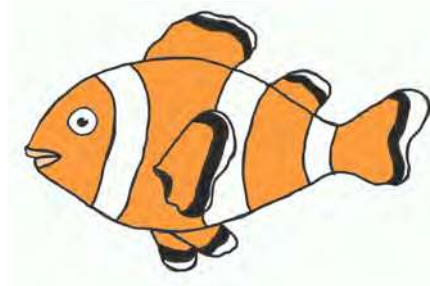
Eagle Ray & Jack (commensalism) - Eagle ray digs up sand to get to shellfish, Jack eats small fish that are exposed as a result

Coral & Zooxanthella Algae (mutualism) - Coral provides algae with protected environment and CO₂, algae produce oxygen and help the coral remove wastes



ANEMONE

- Has stinging tentacles that ward away predators
- Provides place to live



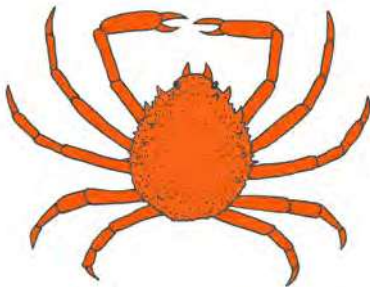
CLOWNFISH

- Needs place to live that provides protection



BARNACLE

- Filter feeder that depends on availability of plankton for food
- Latches on to moving organisms



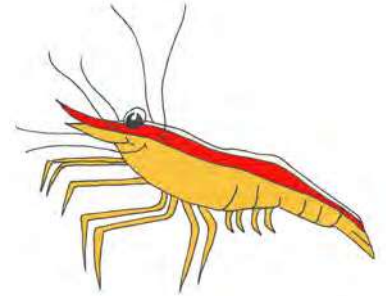
SPIDER CRAB

- Needs protection from predators
- Uses camouflage to blend into the environment



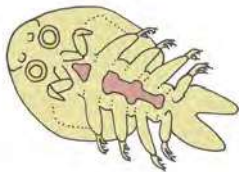
ALGAE

- Tends to grow on stationary things, but can also grow on certain animals, camouflaging them from predators



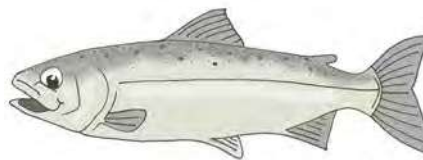
CLEANER SHRIMP

- Eats parasites and organisms from the mouths of fish



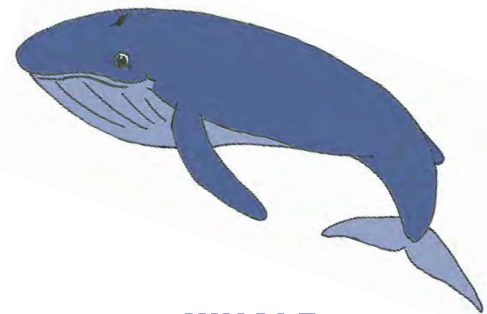
FISH LICE

- Feeds off of skin and blood of fish



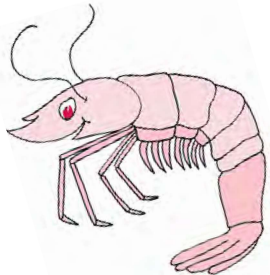
SALMON

- Saltwater fish that has skin and blood that certain organisms feed off of



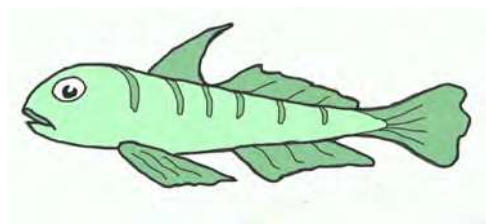
WHALE

- Large mammal that often swims into plankton-rich waters to feed



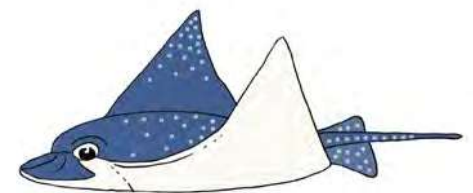
BLIND SHRIMP

- Needs help keeping an eye out for predators
- Digs burrows for protection from predators



GOBY

- Good at keeping an eye out for predators
- Needs a place for protection



EAGLE RAY

- Digs up sand to find shellfish to eat, exposing smaller fish