

# SYMBIOTIC RELATIONSHIPS

SCIENCE/ECOLOGY/BIOLOGY, GRADES: 5–9

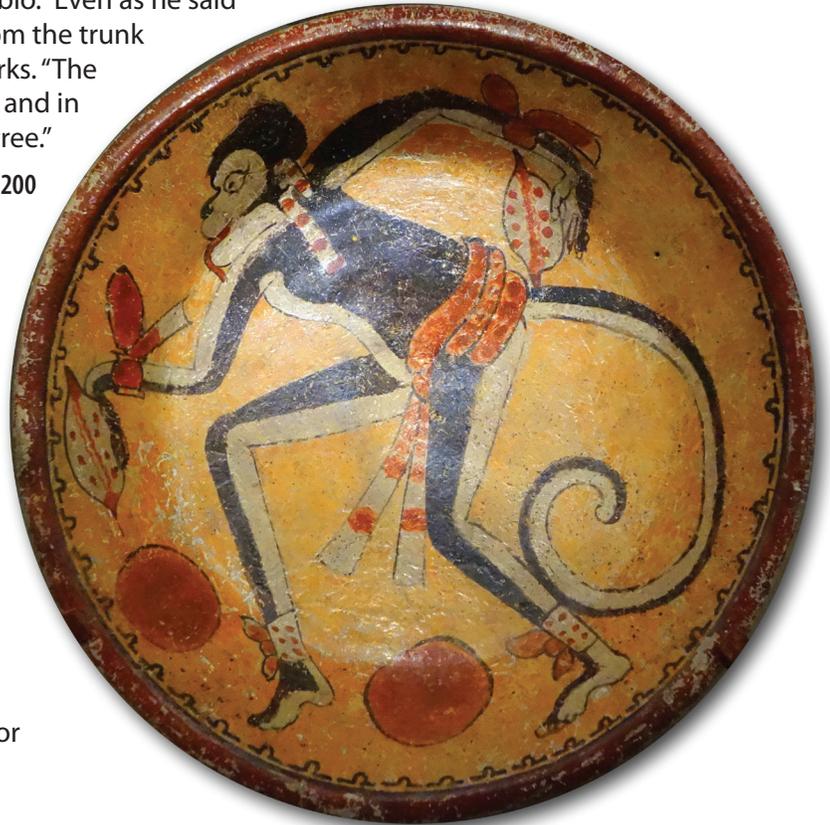
Eusebio had already moved on. “Over here,” he was saying, “is the trumpet tree—so called because my ancestors made trumpets from its hollow trunk.” He handed Max his machete. “Hit it,” he instructed. “And stand back.”

Max whacked the tree as hard as he could.

An unappetizing smell of blue cheese and coconut filled the air.

“It is the smell of angry ants,” said Eusebio. Even as he said it, hundreds of angry ants emerged from the trunk and swarmed toward the machete marks. “The tree makes a nectar for the ants to eat, and in return they act as bodyguards for the tree.”

*The Jaguar Stones, Book One Middleworld, page 200*



## ESSENTIAL QUESTION:

How do rainforest organisms adapt to coexist?

## Sub Questions:

- How do organisms compete with each other in the rainforest?
- What kinds of relationships allow organisms to survive?
- How are these relationships similar to or different from human relationships?

## MATERIALS/RESOURCES:

Paper and pencils, index cards, markers, colored pencils, poster board.

*Cacao trees rely on monkeys to open cacao pods and spread the seeds. Monkeys love eating the pod pulp, but spit out the seeds. No monkeys, no chocolate.*

## OBJECTIVES:

### The students will know:

- Types of competitive interaction between living organisms
- The effect such interactions have on the surrounding environment

### The students will be able to:

- Identify different types of symbiotic relationships and how they relate to the ecology around them.
- Compare and contrast symbiotic relationships found in nature to those that exist between human beings.

---

**RATIONALE:**

All organisms depend, in some way, on others for survival. In the highly competitive conditions of the rainforest, they are forced to adapt to each other to a remarkable extent. This exercise will allow students to better understand and classify such relationships and interactions.

---

**KEY VOCABULARY:**

**Habitat:** the natural environment of an organism

**Niche:** the web of relationships and activities in which an organism participates within its habitat.

**Relationships:**

- **Commensalism:** a type of symbiotic relationship in which one organism benefits, and the other remains unaffected
- **Mutualism:** a type of symbiotic relationship in which both organisms benefit.
- **Parasitism:** a type of symbiotic relationship in which one organism benefits, but the other is harmed.
- **Symbiosis:** a close relationship between two organisms

---

**INTRODUCTORY LESSON: COMPETITION AND INTERRELATIONSHIPS****Procedure:**

1. As a class, discuss niches and how species interact with each other. What are each side's motives for the interaction? Is the result beneficial to one organism, both, or neither? Is competition a good or bad thing, or both? Is it necessary for development? Why or why not?
2. Have each student create a web in which they map out their own niche in daily life. Starting with their name in a bubble at the center, they should create other bubbles with the names of other people they compete with. For example, they may associate siblings with competition for food, attention from parents, or allowance money, or they may associate friends as competition for popularity, or places on a sports team.
3. Students should write a brief response paper on how they handle each of the relationships portrayed in the web. How are potential conflicts resolved, or not resolved? What are the effects on the student and the other people involved?

---

**ACTIVITY 1: MUTUALISM, PARASITISM, AND COMMENSALISM IN THE WILD****Procedure:**

1. Explain the concepts behind three types of symbiotic relationships: mutualism, parasitism, and commensalism. Give examples of these types of relationships in the wild.
2. Divide the class into small groups, and have each group research symbiotic relationships in different habitats (oceans, rainforests etc.) Each relationship should be labeled mutual, parasitic, or commensal.
3. Using their research, have each group create a card game on a set of blank index cards. For each relationship they have researched, students take two cards, and draw one of the organisms involved on each card. Beneath each drawing, students write the names of BOTH organisms involved in the relationship. On the back of both cards, students write the type of their relationship. There should be at least 10 relationships portrayed on 20 cards.
4. Each group then exchanges card sets with another group. Lay all cards drawing side-down, relationship type-up, on a table, and have students attempt to match the pairs, as in the game Memory. When they have played a few rounds, they should switch their cards again with another group, until everyone has played all sets of cards.

**Expansion Activity:**

Divide the students into pairs. Have each pair select a symbiotic relationship in the rainforest, and write a short skit featuring the organisms involved. Encourage the students to be creative as possible, perhaps giving the organisms human characteristics and personalities. Have each duo perform their skit for the rest of the class, and have the class guess whether the relationship portrayed is mutual, parasitic, or commensal.

**Questions for Further Discussion:**

- What effects do these types of relationships have on the surrounding environment?
- What would happen in each type of relationship if one of the organisms ceased to exist?
- What kind of impact would a breakdown in these relationships have on the greater ecosystem?

---

**ACTIVITY 2: COMPETITION WITHIN THE HUMAN BODY****Procedure:**

1. Symbiotic relationships don't just exist outside in nature – they exist everywhere, including inside our own bodies. As a class, brainstorm examples of symbiotic relationships occurring within the human body.
2. Divide the class into three groups, and assign each one a relationship – mutualism, parasitism, or commensalism. Each group should create a poster illustrating the occurrences of their type of relationship within the human body.
3. Each group will present their poster to the class, explaining how each relationship functions and why it falls into their category.

## Questions for Further Discussion:

- Which relationship do you find most interesting and why?
- What happens when a man-made substance (medication, chemicals, etc) introduces itself into these relationships?
- What long-term affects would such an introduction have on the human body as a whole?

---

## ACTIVITY 3: SURVIVAL OF THE FITTEST

### Procedure:

1. Interactions between species are constantly evolving as environments change and organisms adapt to fit their new needs. As a class, discuss how ecology shapes the evolution of symbiotic relationships. How have species adapted to cope with disruptions?
2. Have each student choose a symbiotic relationship from a natural habitat, and imagine that some kind of crisis disrupts it. Students should envision how the relationship will change and evolve to allow for the survival of either one or both organisms involved. Students should imagine they are Darwin-like naturalists and write a journal observing the changes to the relationship. What happened to disrupt the relationship? What problems did it cause the organisms involved and their surrounding organisms? How did they deal with the change? What is the new relationship, and how does it allow for survival?
3. Have each student give a brief presentation to the class in which they discuss their findings.

### Expansion Activity:

Returning to the interaction web made at the beginning of the lesson, have each student classify each interaction as a type of symbiotic relationship. Students should discuss how this new knowledge changes or does not change how they view their relationship with each person in their web.

---

## ASSESSMENT:

Students will be assessed based upon their written work, participation in class discussions, and contributions to group projects.

---

## USEFUL LINKS:

Education Portal: Symbiotic Relationships: Mutualism, Commensalism & Parasitism

<http://education-portal.com/academy/lesson/symbiotic-relationships-mutualism-commensalism-amensalism.html#lesson>

Videos of a range of plants, animals & insects displaying symbiotic behavior

<http://www.vtaide.com/png/symbiosis.htm>

---

**COMMON CORE CONNECTIONS:**

CCSS.ELA-LITERACY.SL.6.1 Engage effectively in a range of collaborative discussions with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CCSS.ELA-LITERACY.WHST.6-8.1 Write arguments focused on discipline-specific content.

CCSS.ELA-LITERACY.WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

CCSS.ELA-LITERACY.WHST.6-8.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-LITERACY.RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CCSS.ELA-LITERACY.RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

CCSS.ELA-LITERACY.SL.6.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CCSS.ELA-LITERACY.WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

CCSS.ELA-LITERACY.SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

CCSS.ELA-LITERACY.SL.6.5 Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.