



# Leaf-cutter Ant Relay (3-7)

Zoo Wild Pack Preparation Activity

## At a glance

Students learn about the lives of leaf-cutter ants by way of role-playing relay, math applications and outdoor observations.

### Time requirement

One session of 60 minutes

### Group size and grade(s)

Group size: 10 – 30 students

Grade(s): 3-7

### Materials

Green construction paper (20 or so sheets)

Scissors (4 to 6 pairs)

Markers or crayons (2 to 4)

Leaf-cutter ant photos

Calculators (optional)

### Goals

To gain background knowledge on leaf-cutter ants.

To alter beliefs and attitudes towards ants.

### Objectives

1. Students will be able to describe how leaf-cutter ants work together as a colony
2. Students will be able to describe at least one benefit ants provide
3. Students will indicate a change in beliefs about and/or attitudes towards ants

### Theme

The tiny leaf-cutter ant can do big things by working together as a colony.

### Academic standards - Science

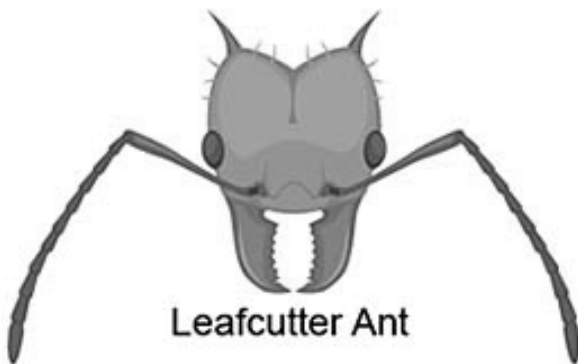
Ohio Science Academic Content Standards	Life Sciences <ul style="list-style-type: none"> <li>• Heredity (4:5)</li> <li>• Diversity &amp; Interdependence of Life (3:2) (5:6) (6:8) (7:3)</li> <li>• Evolutionary Theory (7:7)</li> </ul> Scientific Inquiry <ul style="list-style-type: none"> <li>• Doing Scientific Inquiry (3:2) (5:2-3)</li> </ul> Scientific Ways of Knowing <ul style="list-style-type: none"> <li>• Nature of Science (8:1)</li> <li>• Ethical Practices (8:2)</li> </ul>
Kentucky Core Content— Science	Biological Science <ul style="list-style-type: none"> <li>• Unity &amp; Diversity {SC} (Ep-3.4.1) (04-3.4.1) (06-3.4.2)</li> <li>• Biological Change (SC-05-3.5.2)</li> </ul> Unifying Concepts <ul style="list-style-type: none"> <li>• Interdependence (SC-08-4.7.1)</li> </ul>
Indiana Science Standards	Standard 4 <ul style="list-style-type: none"> <li>• Diversity of Life (3.4.1) (6.4.3)</li> <li>• Interdependence Of Life &amp; Evolution (4.4.3) (5.4.7)</li> </ul> Standard 5 <ul style="list-style-type: none"> <li>• Reasoning &amp; Uncertainty (7.5.4) (8.5.7)</li> </ul>

## Background

Native to the South American rainforest, the highly social leaf-cutter ant (*Atta cephalotes*), or leaf-cutting ant, is named for its habit of cutting and carrying leaves back to its underground nest. The ants do not eat the leaves. Instead, the leaf fragments are used as compost to grow fungus gardens that feed the ants. Other than humans, they are the only animals known to grow their own food from other living matter!

A colony consists of a single **queen** that lays all the eggs (up to 150 million in a lifetime) and up to eight million ants, most of which are sterile female workers. There are different castes of leaf-cutter ants, each with slightly different sizes, body parts, and duties. Some of those castes include:

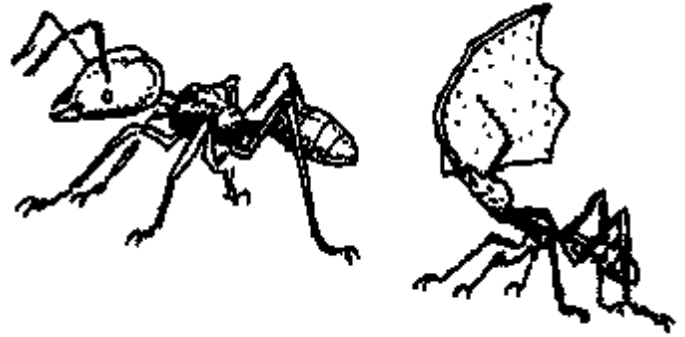
**Foragers** travel along hundred-foot trails, following the pheromones (chemical scents) colony-mates leave behind, through the forest to forage for and cut leaves into pieces. Holding onto a leaf with hooks at the ends of its legs, a leaf-cutter ant slices the leaf as its scissor-like jaws vibrate 1,000 times per second. The ant carries the leaf bit—weighing up to 20 times its body weight—over its head in its mandibles back to the underground nest. A large nest can reach up to 50 feet long and 16 feet deep and contain 3,000 different chambers.



Leafcutter Ant

**Gardener ants** receive the leaf bits, but they do not eat them. They chew and defecate on the leaves to prepare them as compost for growing a fungus garden. The ants have a symbiotic relationship with the fungus from which both benefit.

The Life of a Leaf-cutter Ant, 2010



**Caretakers** harvest the new growth of fungus and take it to the queen, nest mates and larvae to eat. They also tend to the larvae and pupae.

**Soldier ants** are much larger than the other workers (and have heads that are seven times as big) and aggressively defend the colony from predators and other ants.

**Reproductive ants** are produced by mature colonies. Young queens and drones (males) take off in a nuptial flight to mate with those from other colonies. Males die after mating, while the queens attempt to found new colonies. The queens carry a small bit of fungus with them from the original colony from which to start a garden. She loses her wings and spends the rest of her life (up to 15 years) laying eggs.

## Vocabulary

*Colony*—a group of similar animals living together

*Foraging*—seeking out and collecting food

*Mandible*—in insects, mouthparts used for biting, cutting, and holding food

*Symbiosis*—a close relationship between two species that live together

## Activity

### *Getting ready*

Pull together all the necessary materials and identify an open space in which to hold the relay race.

### *Doing the activity*

Inform the students that you will be visiting the Zoo soon. While there, they will conduct an investigation on leaf-cutter ants. What do they already know about leaf-cutter ants? Show the students pictures of leaf-cutter ants. If accessible, go to the leaf-cutting ant page on the Zoo's web site and play the video at:

<http://cincinnati zoo.org/animals/invertebrates/leaf-cuttingant.html>.

### Ant Relay Race

Explain that leaf-cutter ants work together as a colony to farm a fungus for food and that each ant has a specific job. Let's learn a bit more about life inside a leaf-cutter ant colony with a relay race.

Divide the class into two equal teams of about 10 students, and give each student on a team a particular role:

- 1 queen
- 1 larva
- 1 caretaker
- 1-2 gardeners
- 2-3 foragers
- 1 soldier
- 1 spider



The Life of a Leaf-cutter Ant, 2010

The race is best done in a wide, open space such as a gym or lawn. At the starting line, scatter 20 or so sheets of green construction paper on which an outline of a leaf is printed. Give each forager a pair of scissors and place them at the starting line. Place the gardeners, caretakers, queens, and larvae in the "nest" at the opposite end of the course. Give each gardener a brown crayon or marker. The only ants in the nest that can move around within the nest are the caretakers.

The object of the race is to feed the most fungus to your queen and larva, following this sequence.

1. The foragers cut a leaf out of a paper and carry it above their heads to the nest where they pass it on to the gardeners. Then they return for a new leaf.
2. The spiders are intruders that try to tag the foragers that are carrying leaves. The soldiers must defend the foragers and keep the other team's spider from tagging them.
3. Upon receiving a leaf, gardeners draw an X on it to turn it into fungus and pass it on to the caretaker.
4. The caretaker passes the fungus on to the queen or larva.

Whichever team has "eaten" the most fungus at the end (when all paper leaves have been cut out and delivered), wins the race.

### Ant Watching

We don't have leaf-cutter ants outdoors here, but we do have lots of other kinds of ants. Head outside and find some local ants to observe. It may be easiest to spot ants crawling across a sidewalk or other pavement.

Have the students jot down anything they notice about the ants while observing them. What questions do they have about the ants and what they are doing? Where are the ants going? Are they carrying anything? What happens when you place a stick in the way of an ant's path? Will a capful of sugar water or salt water attract more ants?

How can they learn the answers to their questions? Let them be **myrmecologists** (ant biologists) and set up their own investigations to find out.

### Ant Math

Ants can lift up to 20 times their own body weight. Have the students calculate how much they would have to lift to pick up something 20 times their own body weight. Have them look up the current weightlifting record in the Guinness Book of World Records. How many times his own body weight can the world's strongest man lift?

### Wrap-up

We often think of ants as pests. They invade our homes and ruin picnics. They can bite and sting. They can devour crops.

Yet even the seemingly pesky ant plays an important role in nature. Leaf-cutter ants, for example, prune back plants, which stimulates new growth. Tunneling underground, the ants also aerate and return nutrients to the soil.

What are some of the other benefits ants provide to the environment and to us?

Next time you're about to step on an ant, give this little creature a second thought. Every living thing deserves our respect.

### **Assessment**

Have students write about how their feelings and perspectives on ants may have changed following the activities.

*Unsatisfactory*—Did not complete report, or report was extremely brief and lacked thoughtfulness

*Satisfactory*—Report demonstrated a change in attitudes or beliefs about ants

*Excellent*—Very thoughtful report detailed significant impact on attitudes and beliefs about ants

### **Resources**

Frost, Helen and Gail Saunders-Smith. Leaf-Cutting Ants. 2002.

Cincinnati Zoo Web Site,  
[www.cincinnati-zoo.org/animals/invertebrates/leaf-cuttingant.html](http://www.cincinnati-zoo.org/animals/invertebrates/leaf-cuttingant.html)

Further investigations and readings related to leaf-cutter ants are supported at  
[www.WildResearch.org](http://www.WildResearch.org)

