

Termite Pheromones

A Carolina Essentials™ Investigation



Overview

This investigation demonstrates how worker termites sense pheromones. Students observe and document the motions of termites under 2 different conditions: pencil circles and pen circles. The investigation may be used as a discovery introduction or as a confirmatory investigation to pheromones and their effect on animal behavior.

Life Sciences

Grades: 9–12

Essential Question

What role do pheromones play in animal behavior?

Discuss with students to direct their thinking during the investigation.

Investigation Objectives

1. Investigate if termites respond to synthetic pheromones.
2. Determine if pheromones guide a termite's path.

Next Generation Science Standards* (NGSS)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations <ul style="list-style-type: none">• Construct an explanation of the behaviors observed during the investigation.	LS1.A: From Molecules to Organisms: Structures and Processes <ul style="list-style-type: none">• The function of pheromones impacts behavior in termites.	Cause and Effect <ul style="list-style-type: none">• Investigating and explaining causal relationships that may be tested and used to explain events in new contexts.

Safety Procedures and Precautions

Handle the animals with care and respect. Wear safety goggles and gloves.

Disposal

Place termites in a resealable bag, store in the freezer for 1 week, then dispose of them in the trash. Adhere to all local, state, and federal materials disposal guidelines.

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TIME REQUIREMENTS



PREP 1.5 hr | **ACTIVITY** 30 min

Teacher Prep: 30 min

Termite Collection: 60+ min

Student Activity: 20-30 min

SAFETY REQUIREMENTS



MATERIALS (PER GROUP)

2 cups with lids (2.5 oz)

2 termites—termites must be workers

Paper towels

1 small, soft paintbrush

1 sheet of white copy paper

1 pencil

1 black or blue BIC® pen

Resealable bag

HELPFUL LINKS

Carolina.com

Termites Care Guide

REFERENCE KITS

Carolina BioKits®: Group Behavior and Social Insects

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Student Procedure

1. Fold the piece of copy paper in half widthwise (hamburger style), making a sharp crease.
2. Unfold the paper and draw a large circle in pencil on one half of the paper. Trace over the circle several times to make the outline heavy and dark.
3. On the other half of the paper draw a large circle using the BIC® pen. Retrace the circle several times to make it dark and heavy.
4. Gently place a termite in the center of the pencil-drawn circle. Observe the termite motions for 5 to 10 minutes. Record your observations.
5. Gently move the termite to the center of the ink circle using the paintbrush. Observe and record the termite motions for 5 to 10 minutes.
6. Place the first termite in the empty cup using the paintbrush.
7. Repeat the same process with the second termite, but this time begin with the ink circle. Record your observations.
8. Place the second termite in the cup with the first one.

Teacher Preparation and Tips

Prepare two 2.5 oz plastic cups with lids per group by adding a small piece of damp paper towel that covers the bottom of the cup.

Place 2 termites in 1 of the cups at each station.

Demonstrate folding paper.

Demonstrate the size and weight of the circle.

This must be a black or blue BIC® pen. It most closely mimics termite pheromones.

Collect your own termites. Only workers will follow the ink trail. Workers are creamy white, soft-bodied, and wingless.

Demonstrate this step.

Ask students why they are using 2 termites. Termites may be used for multiple classes.

IMPORTANT: *Make sure students don't brush termites onto the floor.*

Students may record data in a class or lab notebook. Ask students why they are using a pencil circle first.

Tech tip: *Allow students to record termite movements for online notebooks or class presentations.*

Data

Descriptions, drawings, or video of termite movement. (The termite should follow the black pen circle but not the pencil circle.)

Analysis

1. Compare the movements of the termites in each circle.

The termites should follow the black or blue BIC® pen circle.

2. What is the reason for the movement?

The formulation of BIC® ink mimics termite pheromones.

3. What role do pheromones play in animal behavior?

*Pheromones are excreted **chemicals** that trigger a social response in members of the same **species**. Pheromones are chemicals that can impact the behavior of the receiving individual. Certain kinds of pheromones, including **alarm pheromones**, food trail pheromones, and **sex pheromones**, affect behavior or physiology. Pheromones are well-documented in many insects.*

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TEACHER NOTES