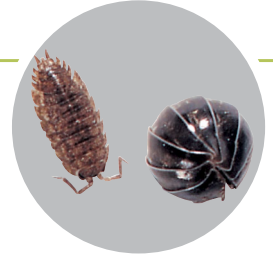


# Pill Bug Behavior Choices

## A Carolina Essentials™ Investigation



### Overview

This introductory investigation into animal behavior uses pill bugs and choice chambers. It is designed for small groups. Students begin with an experiment to test how pill bugs respond to humidity. After completing the experiment, students may design an inquiry to test another environmental factor to which pill bugs may respond. The choice chambers may be used to test humidity, temperature, light intensity, population density, interspecies competition, substrate texture, substrate color, and the presence of food. If time permits, students can carry out the experiment that was designed.

**Life Science**  
**Grades: 6–12**

### Essential Question

Do environmental conditions affect animal behavior?

### Investigation Objectives

1. Investigate how pill bugs respond to humidity levels in their environment.
2. Identify 2 other environmental factors that influence pill bug behavior.

### Next Generation Science Standards\* (NGSS)

| Science and Engineering Practices   | Disciplinary Core Ideas  | Crosscutting Concepts   |
|---|--|---|
| <b>Constructing Explanations</b> <ul style="list-style-type: none"><li>• Students will construct and revise an explanation based on valid evidence obtained from the investigation.</li></ul> | <b>LS2: Ecosystems: Interactions, Energy, and Dynamics</b> <ul style="list-style-type: none"><li>• LS2.C: A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions.</li></ul> | <b>Cause and Effect: Mechanism and Explanation</b> <ul style="list-style-type: none"><li>• Students can suggest cause and effect relationships to explain and predict behaviors in complex natural systems.</li></ul> |

### Safety Procedures and Precautions

Ensure that students understand and adhere to safe laboratory practices when performing any activity in the classroom or lab. Demonstrate the protocol for correctly using the instruments and materials necessary to complete the activities, and emphasize the importance of proper usage. Use personal protective equipment such as safety glasses or goggles, gloves, and aprons when appropriate. Model proper laboratory safety practices for your students and require them to adhere to all laboratory safety rules.

### Disposal

Return the pill bugs to the pail. Throw filter paper in the trash. Clean out the choice chambers and return them to the designated place.

*Continued on the next page.*

### TIME REQUIREMENTS



**PREP** | **ACTIVITY**  
15 min | 20-45 min

Teacher Prep: 15 min for experiment; 60–90 min for pill bug collection if not purchased

Student Activity: 20–45 minutes (depending on optional experiments)

### SAFETY REQUIREMENTS



### MATERIALS (PER GROUP)

Pill bugs  
Choice chambers (2 chambers)  
Filter paper or circles of paper towel  
Dropping pipets  
Cups with lids or petri dishes  
Potting soil or premium garden soil  
Pail with lid  
Beakers or cups for water  
Springwater, deionized water, or tap water treated to remove chloramines  
Plastic spoons  
Stopwatches (preferred), watches with second hands, or smartphones with stopwatch applications  
**Suggested Materials for Optional Experiments**  
Black construction paper  
Instant cold packs or resealable bags with ice  
Instant heat packs or towels soaked in hot water  
Fine and coarse sand  
Gravel  
Potting soil  
Food source (apple, raw potato, or carrot pieces)

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### Preparation

If you ordered pill bugs from Carolina, immediately open the shipping container upon receipt and check their condition. They are shipped in damp paper towels to provide the humidity they require. If the paper towel is not damp, add just enough water to remoisten it. After examining the pill bugs, close the container. If you use the pill bugs right away, no additional care is needed. If you need to keep them for more than a day before use, prepare a holding container.

Punch air holes in the lid of a pail, cover the bottom with moist potting soil, and place a slice of raw potato or apple on the soil. Mist the inside of the pail with room-temperature water. Gently empty the contents of the shipping container into the pail. Carefully unfold the crumpled paper towel and shake off as many of the pill bugs as possible. If you are unable to dislodge all the pill bugs, use a soft artist's brush to remove any that remain. Mist the inside of the pail again and replace the lid.

Pill bugs need little care other than humidity and food. At the end of this lab, return the pill bugs to the container. Feed them leaf litter and pieces of potatoes, apples, or carrots. Immediately remove any food that becomes moldy. This provides what the pill bugs need to thrive and even to reproduce.

### Student Procedure

1. Place a clean sheet of filter paper or paper towel disk into each side of the choice chamber.
2. Using the dropping pipet, dampen the filter paper on 1 side of the chamber. Make sure the paper absorbs all excess water.
3. Use a plastic spoon to transfer 5 pill bugs to each side of the chamber.
4. Put the lids on the chamber.
5. Count and record on the data table the number of pill bugs on each side of the chamber every 30 seconds for 10 minutes. Continue to record data even if they all move to 1 side or stop moving

### HELPFUL LINKS

[Carolina™ CareSheet: Terrestrial Isopods](#)

### REFERENCE KITS

[Carolina STEM Challenge®: How to Train Your Isopod Kit](#)

### Teacher Preparation and Tips

*If you collect your own pill bugs, follow the care instructions listed above.*

*Go over the essential question and objectives with students prior to performing the experiment.*

*Explain and show students how to safely handle the pill bugs.*

*Demonstrate how to connect the choice chambers.*

*Explain “damp.”*

*If permissible, students may use smartphones as a timer.*



*Demonstrate how to transfer the pill bugs without dropping them.*

*Make sure all pill bugs are returned to the stock pail. If you collected them outside, they may be returned to the same spot.*

*Continued on the next page.*

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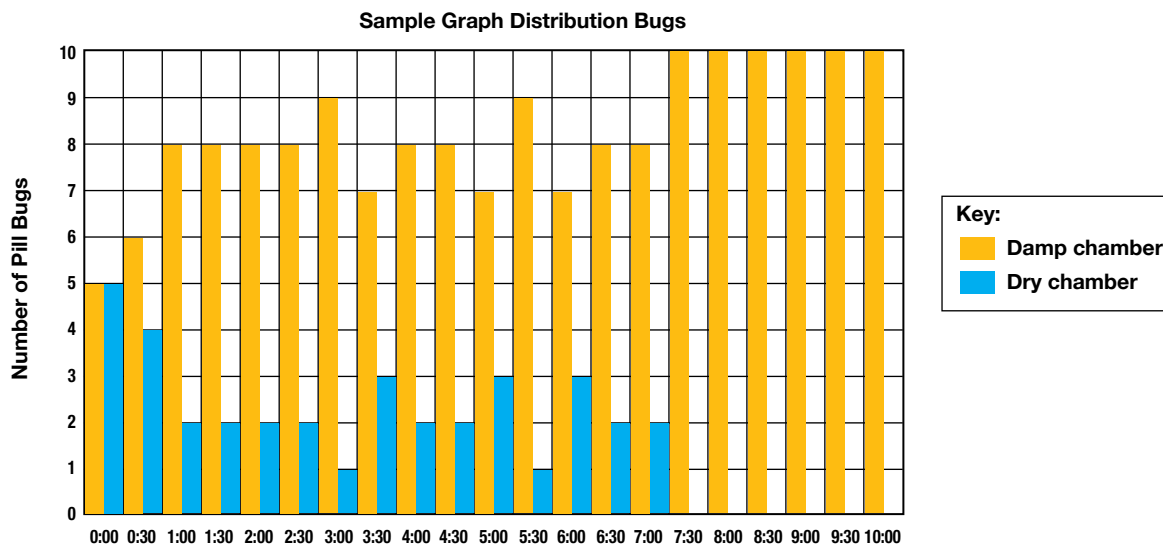
## A Carolina Essentials™ Investigation

### Data and Observations

| Time (min:sec) | 0:00 | 0:30 | 1:00 | 1:30 | 2:00 | 2:30 | 3:00 | 3:30 | 4:00 | 4:30 | 5:00 | 5:30 | 6:00 | 6:30 | 7:00 | 7:30 | 8:00 | 8:30 | 9:00 | 9:30 | 10:00 |    |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|----|
| # on damp side | 5    | 6    | 8    | 8    | 8    | 8    | 9    | 7    | 8    | 8    | 7    | 9    | 7    | 8    | 8    | 10   | 10   | 10   | 10   | 10   | 10    | 10 |
| # on dry side  | 5    | 4    | 2    | 2    | 2    | 2    | 1    | 3    | 2    | 2    | 3    | 1    | 3    | 2    | 2    | 0    | 0    | 0    | 0    | 0    | 0     | 0  |

### Analysis and Discussion

- Graph your data for the damp side and the dry side of the chamber on the same axes. Title the graph and include the following information:
  - The independent variable is *time*
  - The dependent variable is *the number of pill bugs in each chamber*.
  - Plot the independent variable on the x-axis and the dependent variable on the y-axis.



- Based on your graph and the introductory material, explain pill bug behavior with respect to humidity. *From 30 seconds on, there were more pill bugs in the damp chamber than in the dry chamber. From 7 minutes, 30 seconds through the end of the data collection, all 10 pill bugs were in the damp chamber. Pill bugs are crustaceans and breath through gills. They must have a moist environment to survive.*
- Explain how the pill bug response to humidity may be advantageous. *Pill bugs respond to a moist environment because they breathe through gills. This allows them to live and reproduce, continuing the species.*
- Identify 2 more environmental factors that may affect pill bug behavior. *Temperature, light intensity, substrate texture, substrate color.*
- Design an experiment to test 1 of the environmental factors that may affect pill bug behavior. *Answers will vary. Make certain students are testing 1 variable at a time and have a way to quantify the data. A setup similar to the one in the main activity is acceptable.*

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## TEACHER NOTES