



Substrate Selection by Ghost Shrimp

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Suggestions for Teachers

Purpose:

The purpose of this experiment is to determine if ghost shrimp show a preference for a particular substrate surface under artificial conditions.

Background:

Ghost shrimp are geographically widespread. They are an important source of food for many fish, mammals, and birds. Ghost shrimp are omnivorous, seldom predaceous. Their preferred food is aquatic vegetation. Ecologically, they are considered scavengers. Therefore, they contribute to an efficient flow of energy within aquatic habitats. Economically, they have become a favorite source of live food for aquarium fish and are sold in pet stores and are harvested for bait for sport fishing.

Objectives:

1. Students will make observations.
2. Students will be able to design and set up an experiment.
3. Students will be able to take data and graph it.
4. Students will use the Chi Square test for significance.
5. Students will understand taxis and kinesis.

Materials:

Plastic aquariums
Large rocks
Gravel
Aquarium rocks (natural)
Course sand
Baggie to use as divider
Ghost shrimp
Stopwatch

Procedure:

1. Make observations of physical characteristics and behavior.
2. Work with a partner to divide the aquarium in half by putting one type of substrate on one side and a different substrate on the other. Use the baggie as a divider. (The divider should extend beyond the level of the substrate. Do not create a barrier with it.)

Example combinations: Gravel/Sand
Large rocks and Sand/Gravel
Aquarium rocks/Gravel
Large rocks/Aquarium rocks

3. Predict which side will be preferred.
4. Gently add de-ionized water without disturbing the substrate.
5. Using a net, put 10 ghost shrimp in the aquarium. Wait a few seconds to let them settle down.
6. Make a data table to record the number of shrimp on each side and record it.
7. Start the stopwatch and count the shrimp on each side and record it. Repeat every minute for 10 minutes.
8. Graph the data.
9. Use the Chi Square test to see if there is a significant preference for one substrate over another.
10. Write a formal lab report.

Assessment:

Grading Rubric for Lab Report

Use outline form when writing the lab report.

Title	5 points	
Purpose	10 points	
Hypothesis	10 points	
Materials	5 points	
Procedure	10 points	
Results (Data and Graph)	35 points	
Chi Square Test	10 points	
Conclusion	<u>15 points</u>	
	100 points	Total

Teacher Notes:

Ghost shrimp can be purchased for a small amount of money at most pet and aquarium stores. You can collect your own. They are found in many freshwater lakes and streams and in the salt marshes along the coast. Check with the State Parks and Wildlife before you collect to see if there is a limit.

If you collect, you will find them in the vegetation along the banks. Use a benthic net.

Keep the shrimp in an aerated aquarium and feed them flake fish food.

They are vulnerable to cannibalism when they molt and the adults will eat their young. You can provide plenty of shelter sites for the young to hide or separate them from the adults. Eggs are carried on a stalk on the underside of the female ghost shrimp.

Chlorinated tap water will kill ghost shrimp.

It is not necessary to purchase expensive plastic aquariums. Grocery deli containers work well and often the stores will donate them for classroom use or charge just a few cents.

Keep a lid on the containers and the aquarium. The shrimp will jump out.

Chi Square Test Formula
$$\frac{X^2 = \text{Sum of (Observed - Expected)}^2}{\text{Expected}}$$

The critical value in this case with one degree of freedom is 5.99 at the .05 alpha level. If your calculated x^2 is less than 5.99 there is no significant preference for one substrate over another. If the calculated value is greater than 5.99 there is a significant preference.

References:

Kolbe, Christine M. and Luedke, Mark W. 1993. *A Guide to Freshwater Biology*. Texas Water Commission, Field Operations Division, District 7. Texas National Resource Conservation Commission, Austin, TX. 53.

Ogilvie, D.M. and Stinson, R.H. 1992. *Discoveries in Biology: Nondestructive Investigations with Living Animals*. Copp Clark Pitman Ltd. Mississauga, Ontario. L4W 4P7. 159-186.

Pennak, Robert W. 1989. *Fresh-water Invertebrates of the United States*. Third Edition. John Wiley and Sons, Inc. New York. 489-511.