LAB ELEVEN ANIMAL BEHAVIOR

OVERVIEW

In this lab you will observe some aspects of animal behavior.

1. In Exercise 11A you will observe pillbugs and design an experiment to investigate their responses to environmental variables.
2. In Exercise 11B you will observe and investigate mating behavior in fruit flies. Your teacher may suggest other organisms or other types of animal behavior to study.

OBJECTIVES

Before doing this lab you should understand:

- the concept of distribution of organisms in a resource gradient, and
- the difference between kinesis and taxis.

After doing this lab you should be able to:

- describe some aspects of animal behavior, such as orientation behavior, agonistic behavior, dominance display, or mating behavior, and
- understand the adaptiveness of the behaviors you studied.

INTRODUCTION

Ethology is the study of animal behavior. Behavior is an animal's response to sensory input and falls into two basic categories: **learned** and **innate** (inherited).

Orientation behaviors place the animal in its most favorable environment. In **taxis** the animal moves toward or away from a stimulus. Taxis is often exhibited when the stimulus is light, heat, moisture, sound, or chemicals. **Kinesis** is a movement that is random and does not result in orientation with respect to a stimulus. If an organism responds to bright light by moving away, that is taxis. If an animal responds to bright light by random movements in all directions, that is kinesis.

Agonistic behavior is exhibited when animals respond to each other by aggressive or submissive responses. Often the agonistic behavior is simply a display that makes the organism look big or threatening. It is sometimes studied in the laboratory with *Bettas* (Siamese Fighting Fish).

Mating behaviors may involve a complex series of activities that facilitate finding, courting, and mating with a member of the same species.

EXERCISE 11A: General Observation of Behaviors

In this lab you will be working with terrestrial isopods commonly known as pillbugs, sowbugs, or roly-polies. These organisms are members of the Phylum *Arthropoda*, Class *Crustacea*, which also includes shrimp and crabs. Most members of this group respire through gills.

Procedure

1. Place 10 pillbugs and a small amount of bedding material in a petri dish. Pillbugs generally do not climb, but if they do, you may cover the dish with plastic wrap or the petri dish cover.

2. Observe the pillbugs for 10 minutes. Make notes on their general appearance, movements about the dish, and interactions with each other. Notice if they seem to prefer one area over another, if they keep moving, settle down, or move sporadically. Note any behaviors that involve 2 or more pillbugs. Try to make your observations without disturbing the animals in any way. Do not prod or poke or shake the dish, make loud sounds, or subject them to bright lights. You want to observe their behavior, not influence it or interfere with it.

3. Make a detailed sketch of a pillbug.

Kinesis in Pillbugs

1. Prepare a choice chamber as illustrated in Figure 11.1. The choice chamber consists of two large, plastic petri dishes taped together with an opening cut between them. Cut the opening with scissors and use tape to hold the dishes together. Line one chamber with a moist piece of filter paper and the other with a dry piece of filter paper.
2. Use a soft brush to transfer 10 pillbugs from the stock culture into the choice chamber. Place 5 pillbugs in each side of the choice chamber. Cover the chambers.
3. Count how many pillbugs are on each side of the choice chamber every 30 seconds for 10 minutes and then record your data in Table 11.1 (page 128). Continue to record even if they all move to one side or stop moving.
4. Return your pillbugs to the stock culture.
5. Graph both the number of pillbugs in the wet chamber and the number in the dry chamber using Graph 11.1 on page 129.

Figure 11.1 Choice Chamber

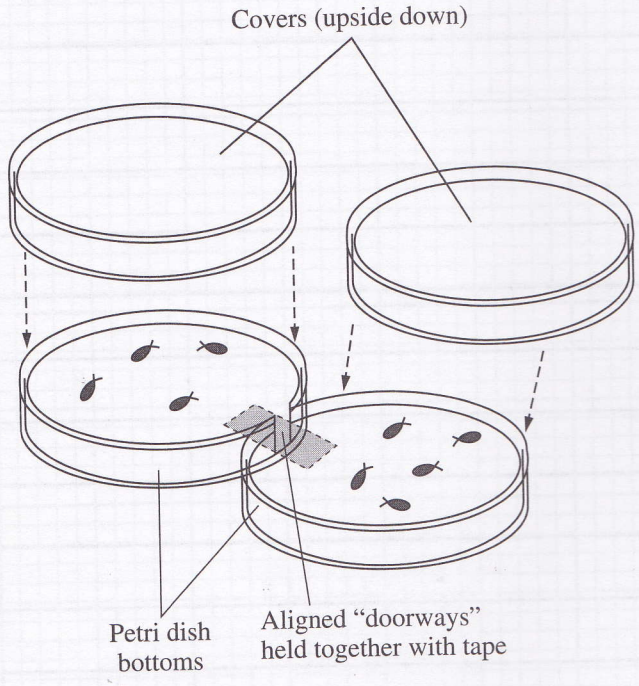


Table 11.1

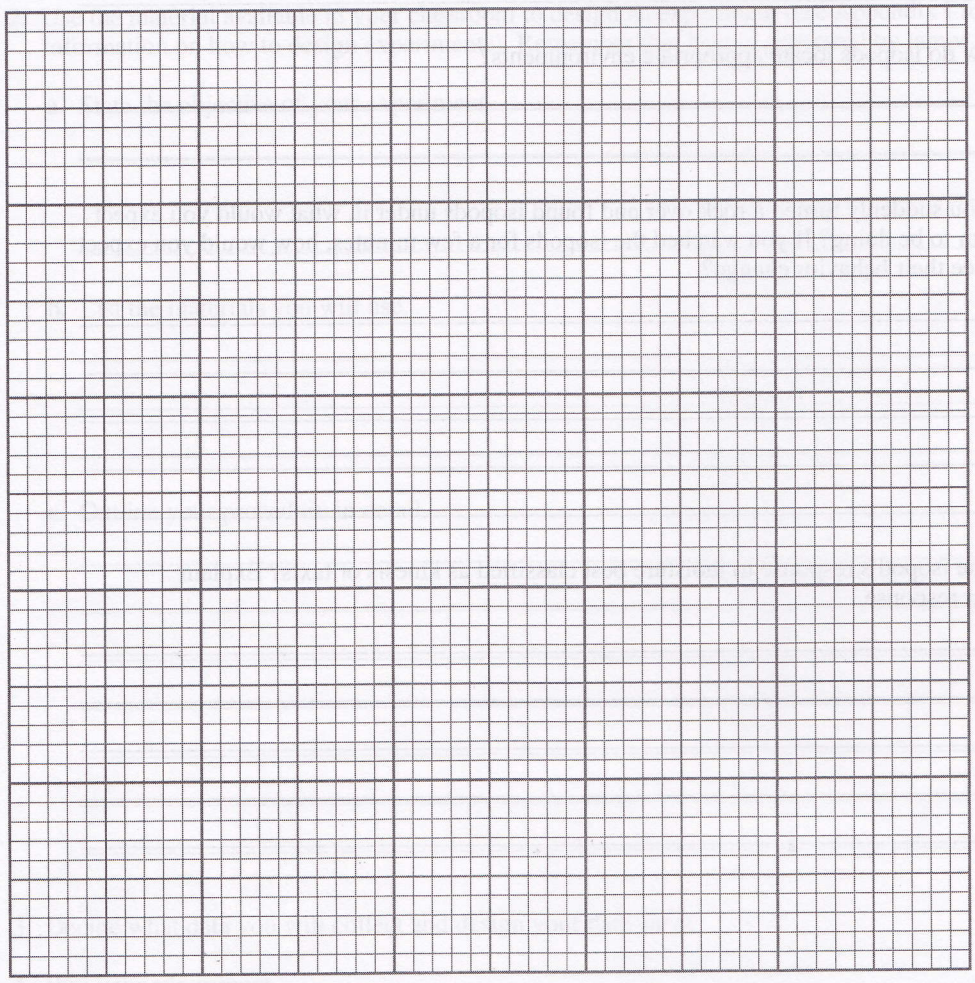
Time (mins.)	Number in Wet Chamber	Number in Dry Chamber	Other Notes
0			
0.5			
1.0			
1.5			
2.0			
2.5			
3.0			
3.5			
4.0			
4.5			
5.0			
5.5			
6.0			
6.5			
7.0			
7.5			
8.0			
8.5			
9.0			
9.5			
10.0			

For this graph you will need to determine the following:

a. The *independent* variable: _____
Use this to label the horizontal (x) axis.

b. The *dependent* variable: _____
Use this to label the vertical (y) axis.

Graph 11.1 **Title:** _____



Analysis

1. What conclusions do you draw from your data? Explain the physiological reasons for the behavior observed in this activity.

_____

_____

_____

_____

_____

2. Obtain results from all of the lab groups in your class. With respect to humidity, light, temperature, and other environmental conditions, which types of environment do isopods prefer? How do the data support these conclusions? Give specific examples.

3. How do isopods locate appropriate environments?

4. If you suddenly turned a rock over and found isopods under it, what would you expect them to be doing? If you watched the isopods for a few minutes, how would you expect to see their behavior change?

5. Is the isopod's response to moisture best classified as kinesis or taxis? Explain your response.

Student-Designed Experiment to Investigate Pillbugs' Response to Temperature, pH, Background Color, Light, or Another Variable

1. Select one of the variable factors listed above and develop a hypothesis concerning the pillbugs' response to the factor.

2. Use the material available in your classroom to design an experiment (see Appendix I for information on how to design experiments). Remember that heat is generated by lamps.

   a. State the objective of your experiment.

   b. List the materials you will use.

   c. Outline your procedure in detail.

3. Decide what data you will collect and design your data sheet.

4. Run your experiment.

5. Make any graphical representation of your data that will help to visualize or interpret the data.

6. Write a conclusion based on your experimental results.

7. Return your isopods to the stock culture.