Animal Behavior: Response to Environmental Variables

Before you begin Part A

Ethology is the science of animal behavior. Many behaviors involve the movements of the animal within its environment. In this lab you will investigate some **innate** (inherited, as opposed to learned) behaviors.

Orientation is the process by which animals position themselves with respect to spatial features of their environments. **Taxis** involves the turning of an animal's body relative to a stimulus. The animal may turn away from, toward, perpendicular to, (etc.), the stimulus. The turning may or may not be followed by a corresponding movement of the animal in relation to the stimulus. **Kinesis** is the random turning or movement of an animal in relation to a stimulus. *Consider the following experiment: a researcher places a dead, rotting mouse in the center of a test surface of 1 m². The researcher then places a carrion beetle (an insect that eats dead animal tissue) somewhere on the test surface and then observes. The beetle crawls forward for three seconds, turns, and crawls in a different direction for three seconds, and continues in this manner. The researcher concludes that the beetle is moving randomly in relation to the dead mouse. Continued observation reveals that the beetle crawls faster and covers more ground when it happens to turn in the direction of the dead mouse. In addition, the beetle crawls slowly and covers less ground when it happens to crawl away from the mouse. In this way, the beetle's random movements will bring it to the dead mouse, at which point other behavior patterns, such as feeding, will take over.*

Agonistic behaviors are aggressive or submissive displays. A common example is a cat's response to an aggressive dog. The cat fluffs its fur and stands sidewise to the dog. This makes the cat appear larger and stronger than it really is.

Activity A1: Initial Observation of Mealworm Behavior (Background research)

Materials

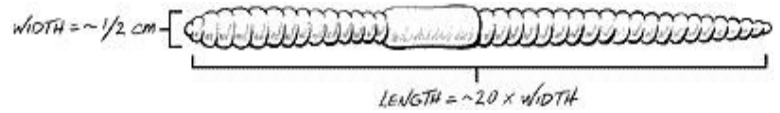1 mealworms in a petri dish or cup, a sorting brush.

Procedure

Observe the mealworms for 10 minutes. Your goal is to observe their undisturbed behavior, so do not bump the container. As you observe, make notes on the mealworms movements and any other behaviors you notice. Below are some questions to think about as you make your observations. Some can be answered through your observations while others will require research about mealworms.

- What type of environment do mealworms prefer in nature?
- When are mealworms the most active? Least active?
- What do mealworms eat? How do they get their food? When do they eat?
- How do the mealworms seem to sense their environment?
- Are they all the same species?

Also, along with your research, make a **<u>detailed sketch</u>** of your mealworm. DON'T just make an oval with a squiggly lines. Take your time and include the following;

  Determine the relative proportions: (use the earthworm as an example)

width length; height length; distance between eyes; width of body ; length of antennae; length of body; Count the number of body segments. Count the number of legs. Label the body parts.

WIDTH = ~ 1/2 CM

LENGTH = ~20 X WIDTH

Background Research

Activity A2: Orientation Behavior of Isopods

Materials

10 mealworms in a petri dish or cup, sorting brush or forceps, choice chamber, two pieces of filter paper, dropping pipet, water, marking pen, stopwatch or timer.

Introduction

In this activity, you will observe mealworms as they respond to <u>humidity</u> differences in their environment over time. You will write a hypothesis using the correct format for this class.

1. Write your "**hypothesis**" below.

If..., Then..., Because...

_____

_____

_____

Procedure

1. Place clean filter paper into each side of the **choice chamber**. Use TAPE to secure the filter paper.

2. Using the dropping pipet, saturate the filter paper on one side of the chamber. Pour off any excess water; do not let the water run into the other side of the chamber and moisten the paper there.

3. Use the sorting brush/forceps to transfer five (5) mealworms to each side of the chamber. Put on the lids.

4. Count and record in Table 1 the number of animals on each side of the chamber, every 30 seconds for 10 minutes. Continue to record even if the mealworms all move to one side or stop moving.

Data Table 1

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	Mean
# on wet side	5																					
# on dry side	5																					

Analysis of Results, Activity A2: Orientation Behavior of Mealworms

Graph the data from Table 1 for both the wet side and the dry side of the chamber. Utilize good graphing technique and supply the following information:

b. The independent (manipulated) variable is_____.

c. The dependent (responding) variable is_____.

Plot the <u>independent</u> variable on the x-axis, and the <u>dependent</u> variable on the y-axis.
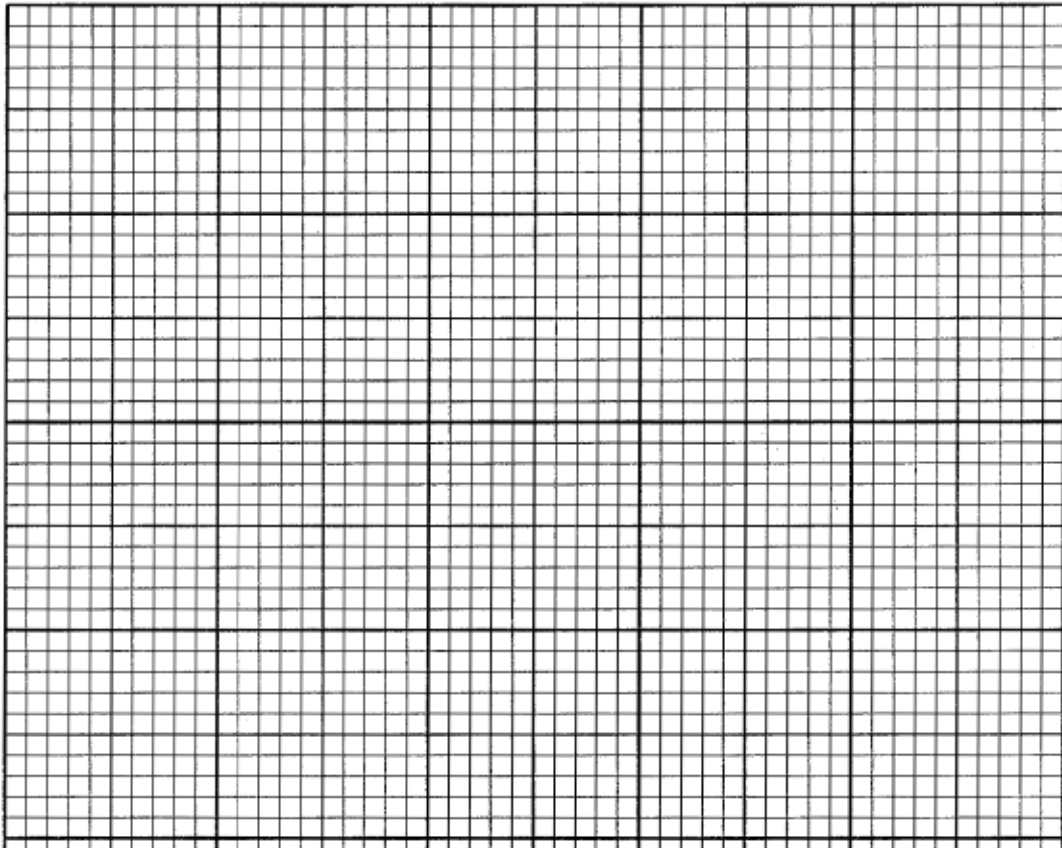
Based on the data you collected and the hypothesis you made, write a well thought out conclusion below. Consider the following as you write your conclusion:

1. Based on your observations, was your hypothesis supported or rejected? Do mealworms prefer moisture in the environment? Explain your answer using your data.

2. Do you feel the movement you observed was achieved through **taxis** or **kinesis**? See your introduction to remind yourself of the difference between the two. Support your answer with observations from your experiment.

3. How might this behavior be advantageous to the mealworms? Is this reflective in the research you did? Why or why not?

4. After carefully thinking about how you carried out this activity, what sources of error could possibly have influenced your results?

5. Now that this activity is complete, what are some additional questions you have. In other words, how can you extend this activity and come up with some additional ideas of study?

Conclusion