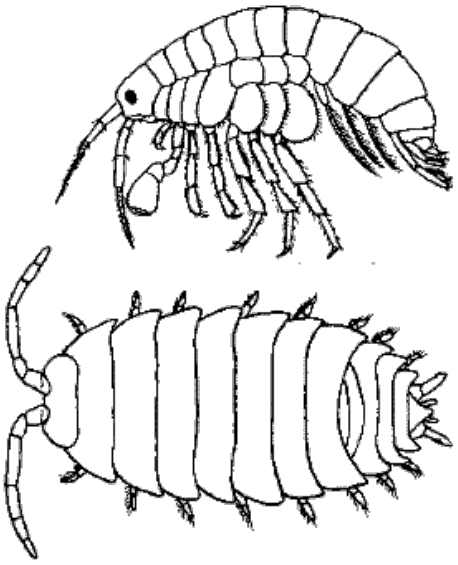
Name: _____

Isopod Behavior, or The RollyPolly Lab

Objectives:

- Observe various aspects of a terrestrial isopod
- conduct experiments examining the responses of isopods to various environmental factors
- design and conduct an investigation of animal behavior



Isopod Handling and Rearing

Raise isopods in a clear shoebox or similar, the bottom should be covered with soil or sand and kept moist (use a mister). An old piece of bark, and leaf litter covering the soil. Isopods can be fed carrots, raw pototoes or apples (alternately fish flakes can be used as food). Moldy food or soil should be removed. Females can carry up to 200 egs in a brood pouch underneath her abdomen and will remain in the pouch for about three weeks - they look the same as adults, only smaller.

Larger isopods can be handled and observed easily with your hand, by picking them up with your fingers or gently scooping them up with a spoon. They are fast walkers and can withstand short drops. Immature isopods are more fragile than adults.

**Isopods are also called sowbugs and pillbugs.

Background Information

Terrestrial ispods are land dwelling crustaceans, commonly known as sowbugs or pillbugs (or rollypollys). They are related to lobsters, crabs, and shrimp and terrestrial isopods breath with gills. While they look similar, sow bugs are different from pill bugs. Pill bugs will curl into a ball when threatened whereas sow bugs will attempt to flee. Since your isopods are caught from the wild, make sure you are using the same type for your experiments.

Ethology is the study of animal behavior. Many behaviors involve movement of the animal within its environment. In this exercise, you will investigate some innate (instincts) behaviors of isopods.

Orientation is a 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 - either toward or away. Kinesis is a random turning or movement of an animal in relation to a stimulus.

Consider the following example: A researcher places a dead rotting mouse in the center of a test area and adds a carrion beetle (an insect that eats dead animals) somewhere on the surface. The beetle crawls forward for three seconds, turns and crawls in a different direction for three seconds, and so on. The researcher concludes that the beeetle 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 more slowly (and covers less ground) when it happens to crawl away from the mouse. In this way, the beetle's random movements will eventually bring it to the dead mouse. It is important to take in details such as time spent crawling in one direction or another when observing the movements of the animals.

Isopod Observations

In the first part of this exercise, you will observe pillbugs and record what you see.

Analysis (include in lab report)

- How do the pillbugs seem to sense their environment?

- Are they all the same species?
- Can you tell the difference in males and females?
- How many eyes do they have?
- How many legs
- Do they exhibit dominance behaviors?
- How do they respire?
- What are some stimuli they seem to respond to?

Scientific Sketching

When you make a sketch of a pillbug, don't just draw an oval with a few squiggly legs - you are expected to do a scientific illustration similar to the sketch of an earthworm below.

Here are some tips for making an accurate sketch (include in your lab report)

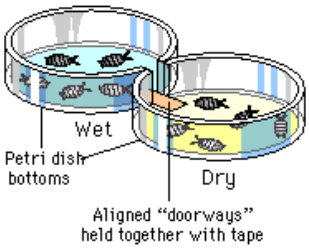
- Determine the relative proportions (length, width, height as well as lengths of body parts)
- Count the number of body segments
- Count the number of legs
- Locate and label the body parts
- Note the size of the pillbug

The Behavior Chamber

For the experiments you design, you will need to create a chamber to test the isopods reactions. Each basic chamber will consist of two sides, each side having a different environment, plus a tube that connects the chambers so that the isopods can move from one place to the other. You will be given the following materials, but the design of your chamber is up to you.

Materials - plastic cups, straws, plastic bowls (or other things your teacher might provide for you). The same chamber can be used for multiple experiments.

Example:



Part A - Orientation of Isopods in Response to Moisture

Procedure: Set up your behavior chamber so that you have one side moist and one side dry (using paper towels). Transfer 5 isopods to each side of the chamber (total of 10). Count and record the number of animals on each side of the chamber every 30 seconds for **ten minutes**, using a table like the one below.

Time (min:sec)	# in Wet	# in Dry	Other Notes
0:00			
0:30			
1:00			

1:30			

Analysis (include in lab report)

1. Based on your observations, do isopods prefer a moist or dry environment.
2. Would this movement be taxis or kinesis?
3. Suggest a reason why this behavior might be advantageous to an isopod

Part B - Student Designed Experiment

Select TWO of the following factors to investigate.

Factor	Materials (suggested)
Temperature	cold pack, warm pack
Light	lamps, flashlights, dark construction paper, aluminum foil
pH	low pH (HCl), high pH (NaOH)
Substrate (surface)	soil, sand, sandpaper, bark, paper, cedar chips, gravel
Odor	ammonia
Food	apple, potato, fish food, lunchmeat
Other Organisms	mealworms, crickets, superworms, earthworms

Begin with a hypothesis, often written as an IF-THEN statement (include in your lab report)

> Poor: I think pillbugs will move toward the wet side of a choice chamber.
> Better: If pillbugs prefer a moist environment, then when they are randomly placed on both sides of a wet/dry choice chamber and allowed to move about freely for 10 minutes, most will be found on the wet side.

Use the procedure above as a guideline to design your experiment, and collect your data. (include in lab report)

Analysis (included in lab report)

1. Did the isopods exhibit kinesis, taxis or an obvious preference to one environment over the other?
2. What advantage might this behavior have for the isopod?
3. How could the experiment be improved?

Lab Report

*Take all your notes and answers to analysis questions, clean them up and turn in a lab report that includes the following. Lab report should be typed (except drawings unless you want to scan them).

1. Background and Purpose (describe the purpose of the experiment, include any relevant information about pillbugs)
2. Isopod Observation (answers to questions, scentific sketch)
3. Orientation in Reponse to Moisture (include data table, analysis questions)
4. Student Designed Experiment (Detailed description of your experiment, your hypothesis, data and conclusions, analysis questions answered)