

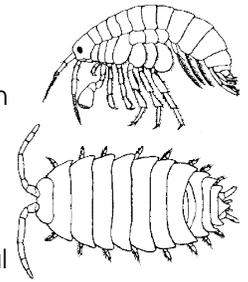
AP Biology Summer Assignment

ASSIGNMENT #1: Science Project Proposal

Lab 11: Animal Behavior of Isopods

Background Information

Terrestrial isopods are land dwelling crustaceans, commonly known as sowbugs, pillbugs or roly-pollys. These organisms are members of the Phylum Arthropoda, Class Crustacea, which also includes lobsters, shrimp and crabs. Most members of this group respire through 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 and can be categorized as **learned** or **innate** (inherited). In this exercise, you will investigate some innate (instincts) behaviors of isopods.

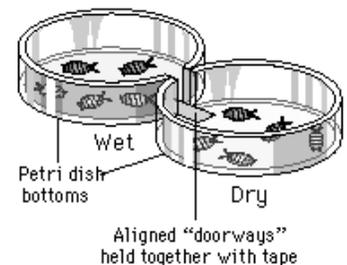
Orientation is a process by which animals position themselves with respect to spatial features of their environments in order to place it in its most favorable environment. **Taxis** involves the turning of an animal's body relative to a stimulus - either toward or away- and is often exhibited when the stimulus is light, heat, moisture, sound, or chemicals. **Kinesis** is a random turning or movement of an animal in relation to a stimulus. If an organism responds to bright light by moving away, that is a taxis; if an animal responds to bright light by random movements in all directions, that is kinesis.

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 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 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.

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.

The Behavior Chamber

For the experiment you will design, you will use a chamber to test the isopod's 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. The same chamber can be used for multiple experiments.



The Student Designed Experiment

Select **one** of the following factors and design an experiment to investigate its effect on an isopod population. You will **NOT** be conducting your experiment at this time! You will be doing this experiment as part of the AP Biology course.

Factor	Materials (possible)
Temperature	cold pack, warm pack
Light	lamps, flashlights, dark construction paper, aluminum foil (caution: heat is generated by lamps)
pH	low pH (HCl), high pH (NaOH)
Substrate (surface)	soil, sand, sandpaper, bark, paper, cedar chips, gravel
Odor	Ammonia
Color	Different colors of paper in chambers
Food	apple, potato, fish food, lunchmeat
Other Organisms	mealworms, crickets, superworms, earthworms

1. Identify Questions & Concepts to be investigated:

- a. What is your **research question**? (What do you want to find out?)
- b. Write your **hypothesis** as an IF-THEN statement. (What do you predict will happen?)

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.

- c. (Research info)
- d. State your objectives: (What you hope to learn at the end of the experiment.)

2. Design the Investigation

- Materials
- Procedure outline (in detail)
- Constants
- Variables: Identify the independent and dependent
- Control
- Describe Amount of trials conducted
- How will you organize the data?