

# Invertebrate Classification

## Topic

Invertebrates captured in a pitfall trap can be sorted by class.

## Introduction

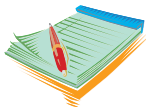
Invertebrates are animals that do not have a backbone. The largest group of invertebrates is the *arthropods*, organisms with jointed appendages. Arthropods are placed in classes based upon number of legs. Class *Myriapoda* contains the many-legged arthropods such as centipedes and millipedes. Arthropods with 10 legs, members of the class *Crustacea*, include shrimp, lobsters, and pill bugs. Spiders, scorpions, and ticks are members of class *Arachnida*. Class *Insecta* includes six-legged organisms such as beetles, ants, and bees. In this experiment, you will collect some soil invertebrates and sort them by class.



## Time Required

55 minutes on day 1

90 minutes on day 2



## Materials

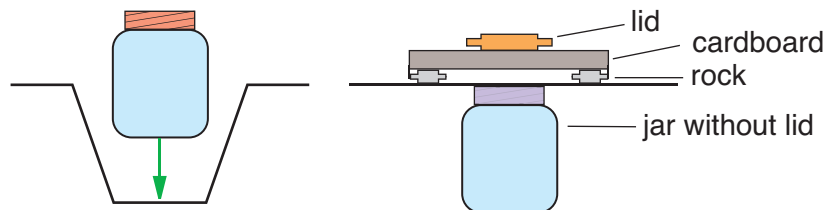
- 3 or 4 baby food jars with lids
- nail
- hammer
- hand lens
- hand trowel
- 4 small rocks
- small square of thick cardboard or wood (large enough to cover a baby food jar)

- honey (optional)
- dropper (optional)
- arthropod identification book or access to the Internet
- science notebook

**Safety Note** Please review and follow the safety guidelines.  
**Do not handle invertebrates captured in the pitfall trap.**

**Procedure: Day 1**

1. Locate three or four areas around your school building where you think invertebrates may be found living in the soil. Map those locations in your science notebook.
2. While the lid is in place on the jars, use the nail and hammer to carefully put one small hole in the center of the lid.
3. Construct a pitfall trap like the one shown in Figure 1. To do so:
  - a. Dig a hole so that when the jar is placed in it, the top of the jar is level with the surface of the ground.
  - b. Place the jar in the hole and fill in around it with dirt. Make sure the top of the jar is completely surrounded with dirt.
  - c. You may choose to place a small drop of honey in the bottom of some of the jars to attract the invertebrates. Do not bait all of the jars.
  - d. Place four small rocks around the top of the jar, then lay a piece of cardboard on top of the rocks to keep out rain and leaves. Set the jar lid on top of the cardboard.
  - e. Loosely cover the cardboard with leaves, grass, or other materials to make the area look as natural as possible.



**Figure 1**

4. Repeat this procedure for the other jars at other locations on campus. Allow the traps to remain in the ground for at least 24 hours.

### Procedure: Day 2

1. To remove a trap from the ground, brush away the leaf litter and carefully remove the cardboard. Place the lid on the jar and remove the jar from the soil. Fill in the hole before leaving the area. Repeat this procedure for the other jars.
2. Keep the lids on the jars. Do not handle the organisms; some of them may bite or sting.
3. Carry the jars back to the classroom, and use a hand lenses to view the organisms. Based on the number of legs, classify the specimens as myriapods, crustaceans, arachnids, or insects.
4. In your science notebook, draw the organisms. Use an arthropod identification book to find the names of the arthropods.
5. Release the organisms back into the environment as directed by your teacher.

### Analysis

1. In which areas did the traps contain the most organisms?
2. In which taxonomic group did most of the organisms belong?
3. What effect, if any, did placing honey in the jars have on the kinds and amounts of organisms collected?



### What's Going On?

Soil provides a habitat for an amazing diversity of invertebrates of all classes. The number and variety of these organisms is directly linked to their importance in the environment. The roles of soil invertebrates include breaking down organic matter, soil aeration, and recycling nutrients. Without these organisms, organic matter would build up on the earth and nutrients would be lost to the food chain. Worldwide, arthropods are dominant organisms. Of the

classes of arthropods, insects and arachnids are most numerous in soil ecosystems. Most of these organisms are found in the top soil.

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## INVERTEBRATE CLASSIFICATION

**Suggestion for class discussion:** Have students predict some of the organisms that they might expect to find living in the topsoil. Ask them to separate the organisms into four broad categories: producers, herbivores, carnivores, and detritivores.

**Teacher notes:** Good arthropod identification books include *Audubon Society Guide to North American Spiders and Insects* by Lorus Milne, Alfred A Knopf, A Chanticleer Press edition, 1980, and *Smithsonian Handbooks: Insects* by George C. McGavin, Dorling Kindersley Inc., New York, 2002.

### Analysis

1. Shady areas that have loose topsoil and leaf litter are more likely to harbor a wide variety of organisms.
2. Answers will vary based upon the types of organisms collected; however, insects are most likely to outnumber other groups.
3. Answers will vary depending on the types of organisms in the area. It is possible that organisms that are not carnivorous would be drawn to the baited traps.

## **SAFETY PRECAUTIONS**

### **Review Before Starting Any Experiment**

Each experiment includes special safety precautions that are relevant to that particular project. These do not include all the basic safety precautions that are necessary whenever you are working on a scientific experiment. For this reason, it is absolutely necessary that you read and remain mindful of the General Safety Precautions that follow. Experimental science can be dangerous, and good laboratory procedure always includes following basic safety rules. Things can happen very quickly while you are performing an experiment. Materials can spill, break, or even catch fire. There will be no time after the fact to protect yourself. Always prepare for unexpected dangers by following the basic safety guidelines during the entire experiment, whether or not something seems dangerous to you at a given moment.

We have been quite sparing in prescribing safety precautions for the individual experiments. For one reason, we want you to take very seriously every safety precaution that is printed in this book. If you see it written here, you can be sure that it is here because it is absolutely critical.

Read the safety precautions here and at the beginning of each experiment before performing each lab activity. It is difficult to remember a long set of general rules. By rereading these general precautions every time you set up an experiment, you will be reminding yourself that lab safety is critically important. In addition, use your good judgment and pay close attention when performing potentially dangerous procedures. Just because the book does not say “Be careful with hot liquids” or “Don’t cut yourself with a knife” does not mean that you can be careless when boiling water or using a knife to punch holes in plastic bottles. Notes in the text are special precautions to which you must pay special attention.

### **GENERAL SAFETY PRECAUTIONS**

Accidents caused by carelessness, haste, insufficient knowledge, or taking an unnecessary risk can be avoided by practicing safety procedures and being alert while conducting experiments. Be sure to

check the individual experiments in this book for additional safety regulations and adult supervision requirements. If you will be working in a lab, do not work alone. When you are working off-site, keep in groups with a minimum of three students per groups, and follow school rules and state legal requirements for the number of supervisors required. Ask an adult supervisor with basic training in first aid to carry a small first-aid kit. Make sure everyone knows where this person will be during the experiment.

### **PREPARING**

- Clear all surfaces before beginning experiments.
- Read the instructions before you start.
- Know the hazards of the experiments and anticipate dangers.

### **PROTECTING YOURSELF**

- Follow the directions step by step.
- Do only one experiment at a time.
- Locate exits, fire blanket and extinguisher, master gas and electricity shut-offs, eyewash, and first-aid kit.
- Make sure there is adequate ventilation.
- Do not horseplay.
- Keep floor and workspace neat, clean, and dry.
- Clean up spills immediately.
- If glassware breaks, do not clean it up; ask for teacher assistance.
- Tie back long hair.
- Never eat, drink, or smoke in the laboratory or workspace.
- Do not eat or drink any substances tested unless expressly permitted to do so by a knowledgeable adult.

### **USING EQUIPMENT WITH CARE**

- Set up apparatus far from the edge of the desk.
- Use knives or other sharp-pointed instruments with care.

- Pull plugs, not cords, when removing electrical plugs.
- Clean glassware before and after use.
- Check glassware for scratches, cracks, and sharp edges.
- Clean up broken glassware immediately.
- Do not use reflected sunlight to illuminate your microscope.
- Do not touch metal conductors.
- Use alcohol-filled thermometers, not mercury-filled thermometers.

### **USING CHEMICALS**

- Never taste or inhale chemicals.
- Label all bottles and apparatus containing chemicals.
- Read labels carefully.
- Avoid chemical contact with skin and eyes (wear safety glasses, lab apron, and gloves).
- Do not touch chemical solutions.
- Wash hands before and after using solutions.
- Wipe up spills thoroughly.

### **HEATING SUBSTANCES**

- Wear safety glasses, apron, and gloves when boiling water.
- Keep your face away from test tubes and beakers.
- Use test tubes, beakers, and other glassware made of Pyrex™ glass.
- Never leave apparatus unattended.
- Use safety tongs and heat-resistant gloves.
- If your laboratory does not have heat-proof workbenches, put your Bunsen burner on a heat-proof mat before lighting it.
- Take care when lighting your Bunsen burner; light it with the airhole closed, and use a Bunsen burner lighter in preference to wooden matches.



- Turn off hot plates, Bunsen burners, and gas when you are done.
- Keep flammable substances away from flames and other sources of heat.
- Have a fire extinguisher on hand.

**FINISHING UP**

- Thoroughly clean your work area and any glassware used.
- Wash your hands.
- Be careful not to return chemicals or contaminated reagents to the wrong containers.
- Do not dispose of materials in the sink unless instructed to do so.
- Clean up all residues and put them in proper containers for disposal.
- Dispose of all chemicals according to all local, state, and federal laws.

**BE SAFETY CONSCIOUS AT ALL TIMES!**