

Berlese Funnel

Overview Unsurprisingly, often the most interesting critters found in soil are the hardest to find! They're small, fast, and used to avoiding things that search for them. So, how do we find and study these tiny insects? With a Berlese Funnel (also called the Tullgren funnel)!

What to Learn Certain bugs are attracted to heat, but then they move around so we can't observe them easily, especially if they are in the dirt itself. You're going to learn how to build a light trap to pull the light-loving bugs up out of the dirt so you can observe them like a real scientist.

Materials

- 1 gallon tractor funnel.
- Clothespins.
- A light fixture that fits on top of the funnel and has a reflective interior.
- A bucket that has a smaller diameter than the top of the funnel. The funnel needs to be suspended from the bucket so the insects can fall into the jar.
- A clean jam-jar.
- Rubbing alcohol.
- ¼ inch wire mesh.
- Light bulb. The wattage has to be high enough to heat the soil, but not so high that it will light the funnel on fire. Best to do it by trial and error with lots of supervision.
- Soil. The best will be from a compost pile.

Experiment

1. Cut a large hole in the side of the bucket. This will allow you to retrieve the jar without disassembling the apparatus. Naturally, the hole should be larger than the jar.
2. Fit the wire mesh so that it covers the bottom third of the funnel.
3. Fit the funnel on top of the bucket.
4. Fit the light fixture (with the light bulb in it) on top of the funnel with the clothespin.
5. Place the jar underneath the funnel (with or without the rubbing alcohol depending on if you want the specimens dead or alive).
6. Simply turn on the light and wait. Check the vial every fifteen minutes or so for an hour. After you have finished remember to turn off the light! Also, remember that some of the specimens may be very small and best observed under a microscope. For the best results operate your funnel in the morning or on a cold day.
7. Draw a diagram of the different parts of your funnel and label each part:

Reading

The funnel separates the insects from the soil with heat. A light bulb heats the soil at one end of a funnel and causes the insects to migrate, through mesh, to a preservative liquid at the other end of the funnel. Originally Antonio Berlese used a hot water bottle to provide the heat. Later, Albert Tullgren modified the funnel to work with a light bulb. Thus, we now call it the Berlese Funnel, the Tullgren Funnel, or the Berlese-Tullgren Funnel.

How the funnel works: The light creates heat. The insects in the soil don't like heat, so they move from the soil through the funnel into the jar. The jar is filled with rubbing alcohol preserves the specimens. The wire keeps most of the soil from falling into the jar.

Exercises

1. Why are some insects difficult to find in soil?
2. Why does the Berlese Funnel work to find insects?
3. What if the insects do not respond to the heat lamp in your experiment?
4. What types of insects were you able to find using the Funnel?

Answers to Exercises: Berlese Funnel

1. Why are some insects difficult to find in soil? (Because it is too dark and they are too small.)
2. Why does the Berlese Funnel work to find insects? (Because it makes the temperature too hot for insects, so they seek a cooler space.)
3. What if the insects do not respond to the heat lamp in your experiment? (The heat may not be hot enough to create a temperature difference between the cooler space and the soil under the lamp.)
4. What types of insects were you able to find using the Funnel? (answers may vary)