

Critters Beneath our Feet – Critter Catcher

Extraction and examination of soil and plant litter fauna

In this exercise you will construct a collection apparatus (Berlese funnel) to collect and compare the small fauna that live in leaf litter and the organic horizon of the soil in a forest ecosystem.

The smaller soil fauna (smaller than earthworms or millipedes, for example) are not well known, but they are very diverse, and very important. They are usually around 1-2 mm in size. There are thousands of species of these smaller animals, some of them not yet named by scientists (or probably even collected), but many of them fall into two groups: (a) mites or (b) springtails.

Mites are actually relatives of spiders – they have eight legs. They have a variety of roles in the soil and litter, from chewing up the litter into smaller pieces, thereby making it more available to microbes for decomposition, to grazing (eating) the fungi that grows on leaf litter. Some of the bigger mites are predators, and will eat any smaller animal they come across (refer to picture of mite – need to insert into document)

Springtails are closely related to insects – they have six legs. Like many mites, they chew up leaf litter into smaller pieces, and eat the fungi that grow on the leaf litter. The reason they are called springtails is because they have a tail-like appendage, called a furcula, which is held beneath the body and flips outwards, projecting them high into the air. They usually jump when they feel threatened (such as by a predatory mite!) (refer to picture of springtail).

Laboratory preparation:

- 1) Construct a Berlese (pronounced bur-lee-zee; named after Italian scientist Antonio Berlese) funnel trap using a glass jar, thick paper, some small-pore size plastic window mesh, a moist paper towel, and a desk lamp.
 - a. Fold the moist paper towel into a square that fits flat against the bottom of the glass jar.
 - b. Role the heavy paper into a funnel in a shape that allows it to rest on the edge of the jar and so the end of the funnel is above, but not touching, the moist paper towel on the bottom of the jar
 - c. Cut and place the mesh into the funnel such that soil or plant litter can be placed in the funnel without falling through
 - d. Position the lamp as close to the top of the funnel as possible, but taking note that the paper does not catch fire.

In the field:

- 2) Collect decomposing leaf litter and O horizon soil from a forest ecosystem: In a small area (10 x 10 cm), using your hands or a small trowel, collect the litter layer from the soil surface. Then collect a sample of the surface O horizon from the same area. This should be distinguishable from the lower layers/horizons because it is dark brown or black coloured and feels soft (has little or no 'grittiness' when rubbed between your finger and thumb that would indicate the presence of mineral sand particles). Note that in some ecosystems the O horizon of soils can be very thin (less than 1cm thick). Does the plant litter that is the primary parent material for the O horizon of each soil actually resemble the O horizon?

- 3) Place your samples in ziplock bags, seal them, and label the outside with a sharpie with your name and which layer of soil is in the bag.

Back at the lab:

- 4) Place a thin layer of the soil on the mesh in the Berlese funnel and turn on the light. The heat from the lamp is uncomfortable for the soil animals, so they burrow downwards and fall through the funnel onto the paper towel.
- 5) After 30 minutes, carefully remove the moist paper towel and examine and count the soil insects that are stuck to the towel with your naked eye, and with a 5× hand lens or dissecting microscope, if available.
- 6) Repeat the procedure with the leaf litter.
- 7) What differences do you observe in terms of total numbers and types (e.g. different sizes, shapes, colours) of soil fauna between the leaf litter and the soil organic matter?
- 8) Can you spot any mites or springtails in your soil or litter samples? What traits did you use to help you find them?