A guide to microinvertebrate life in the leaf litter

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References: http://cbc.amnh.org/center/pubs/pdfs/leaflitter.pdf

Roundworms
Phylum Nematoda

Microscopic, worm-shaped animals found in both aquatic and terrestrial environments. Some live in the guts of other animals, while some live inside the roots of plants. Soil nematodes are critical in recycling dead organic material. They feed on bacteria, fungi, small earthworms, and other roundworms. You can find millions of roundworms in a square meter!

Worms
Phylum Annelida; Class Oligochaete

Aquatic earthworms are generally collectors or gatherers that burrow through the upper layer of soft, fine sediment grazing on bacteria, protozoa, algae, and dead organic matter. They can absorb oxygen throughout their entire bodies. Terrestrial earthworms found in the Northeast today are all recent immigrants from Europe and Asia, and are considered invasive in our forests as they reduce the nutrients available for plants and increase decomposition time. They were once native to the United States, but the glaciers from the last ice age pushed them further south.

Phylum Arthropoda
Order Isopoda

These insects are commonly known as sowbugs or pill bugs. They have hard, flattened exoskeletons and seven pairs of legs. Sowbugs are scavengers and eat mostly dead or decaying plant material. They are the only crustaceans adapted for life on land, but they need to be moist in order to survive.

Phylum Arthropoda
Class Arachnida; Order Araneae

Spiders are a dominant predatory group found in leaf litter. They have four pairs of legs and a body divided into two parts, the cephalothorax and the abdomen. All spiders produce silk, but only some use it to catch their prey. Even though spiders have eight eyes, they do not see very clearly. To sense their environment, spiders have specialized hairs on their legs called *setae.* Spiders feed mostly on insects, so they are very important in controlling insect populations.

Phylum Arthropoda
Class Arachnida; Order Pseudoscorpiones

These animals have four sets of legs like spiders, but they superficially resemble scorpions or very small lobsters, hence their name. They do not sting, but have very strong jaws and pincer-like claws for grabbing prey, which they subdue with poison from glands in their jaws. Pseudoscorpions can be found in leaf litter, soil, tree bark, caves or host nests of other organisms.

Phylum Arthropoda
Class Arachnida; Order Acari (mites)

Mites are very small (less than 1mm), yet very abundant. They have short legs and unsegmented bodies. They eat decaying plant material, mold and other smaller soil organisms. There are three types of soil and leaf litter mites: oribated mites, mesostigmated mites and prostigmated mites.

Phylum Arthropoda
Class Diplopoda

Millipedes have long, segmented bodies with two pairs of legs per segment. Most millipedes are herbivores or scavengers that consume decaying plant material, moss and fungi, which contributes to the production of humus. They live in the upper soil layer and in leaf litter where it is moist, and are usually active at night. For protection, many millipedes exude a smelly, cyanide-based liquid that can burn skin if handled. They have the potential to survive ten years!

Phylum Arthropoda
Class Chilopoda

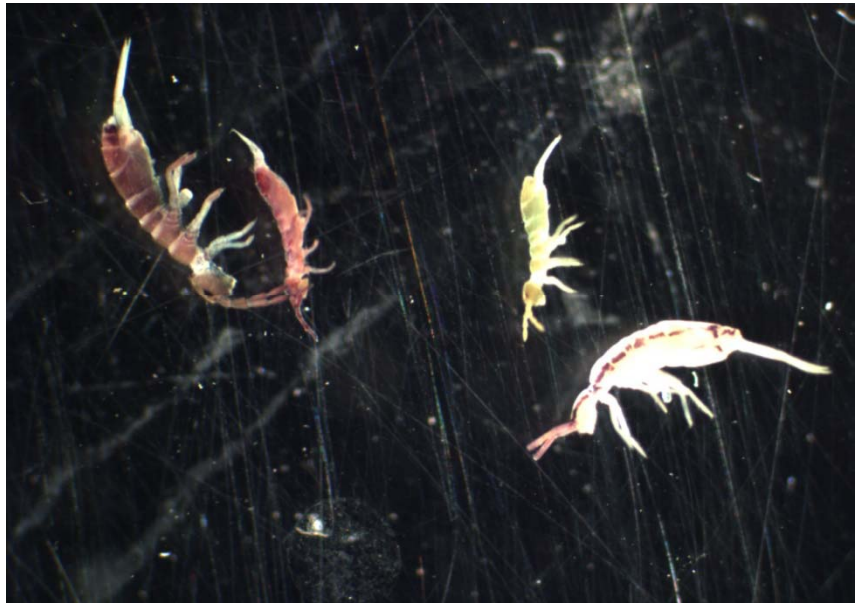
Centipedes can be found in leaf litter and soil, under rocks and logs. They are predators of other invertebrates, especially small earthworms. Centipedes have pincers just behind their heads on the first body segment, which they use to pierce their prey and inject their poison. Soil centipedes live deep in the soil while stone centipedes live in the leaf litter surface.

Phylum Arthropoda
Class Symphyla

Symphylans are tiny, colorless and well-suited to life underground in the soil pore spaces around plant rootlets. Instead of eyes, they have many sensory cells at the tips of their antennae and at the base of the third to last pair of legs. Their terminal body segments carry a pair of silk-producing spinnerets, which spin silken thread used to deter predators. Most species are omnivorous and can feed on either plant or animal matter.

Phylum Arthropoda
Order Collembola (springtails)

Springtails have forked springing organs on their abdomens that allow them to jump away from their enemies. They play an important role in the decomposition process. Springtails have six legs, no wings and usually do not grow bigger than one centimeter. They eat fallen leaves, other detritus, algae and fungi. Together with mites, springtails make up the most abundant group of leaf litter invertebrates.



Phylum Arthropoda
Class Insecta
Order Coleoptera

Beetles account for more known species than any other living thing on the planet. There are more that 300,000 described species of beetles in the world. Adult beetles have three pairs of jointed legs, one pair of antennae and a pair of special front wings called *elytra*. These wings and a hard exoskeleton provide a strong protective armor. Some beetles feed on plant parts, some are predators, scavengers or parasites and others are fungal feeders.

Phylum Arthropoda
Class Insecta
Order Hemiptera

Hemiptera are true bugs. Their first pair of wings is toughened and hard, while the rest are membranous. They have modified piercing and sucking mouthparts. Some suck plant juices and are plant pests.

Phylum Arthropoda
Class Insecta
Order Diptera

Diptera are commonly known as flies and are one of the largest groups of insects. There are 25,000 species found in North America. They are found in almost every habitat, including leaf litter. Fly larvae play an essential role in decomposition, by feeding on decaying organic material. All fly larvae lack jointed legs, but some have ridges along their bodies that allow them to move

Phylum Arthropoda
Class Insecta
Order Hymenoptera

The order hymenoptera consists of bees, ants, and wasps. Many of these species build their nests in the ground beneath the litter layer. Native bees are mostly solitary and do not build large colonies like the honey bees introduced from Europe do. Wasps are important insect predators and native bees are responsible for pollinating many woodland wildflowers. Ants can be found in a diverse number of ecosystems worldwide.

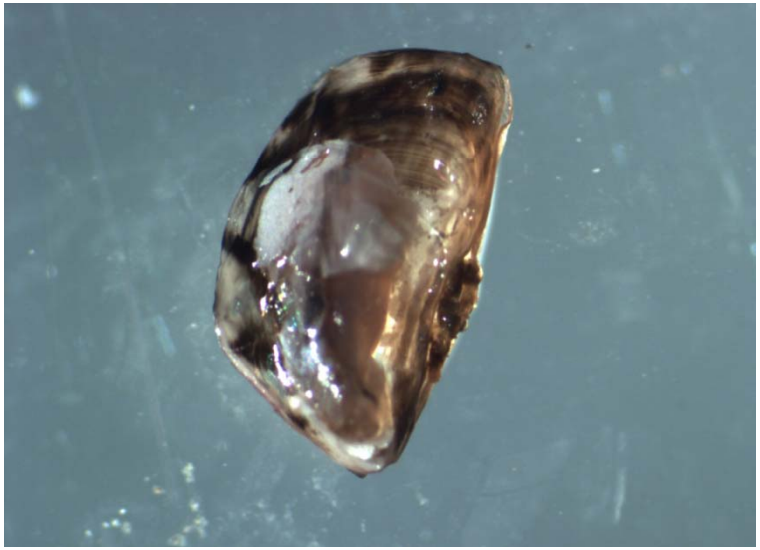
Phylum Mollusca

Class Gastropoda

Snails have coiled shells into which they retreat for protection. They produce a thick layer of slime to help them travel from leaf to leaf. They are found in moist environments near a good source of lime, which provides the calcium that their shells need to develop. They are often found in leaf litter, where they hide by day and emerge at night to feed on leaves and fungus.

Phylum Mollusca

Class Bivalvia



Bivalves have a shell consisting of two rounded plates joined at one edge by a flexible ligament. Most bivalves are filter feeders, meaning they use their gills to capture small particles of food from the water. Shown here is a zebra mussel, which is native to Europe and is considered an invasive species in the United States, that threatens native ecosystems.

Phylum Arthropoda

Class Insecta

Order Emphemeroptera

These species are commonly known as mayflies. They go through many nymph stages in which they live in water, then have two flying stages. They have large forewings and reduced or nonexistent hind wings. Most mayflies can be identified by their long, delicate three tails. Mayflies generally feed on detritus and algae.

Phylum Arthropoda

Class Insecta

Order Diptera

Midge larvae can be found in aquatic or semi aquatic habitats, including leaf litter and soil. They often feed on detritus. This fly larvae has ridges on its body that help it move about its environment. In the Hudson River, midge larva in the genus *Rheotanytarsus* spin silk “capture” nets that they hold out in front of their head capsule to capture food. Since the river is tidal, it is thought that these nets allow the midge to obtain food as the river changes from flowing north to south, since they are generally anchored on a surface.

Phylum Platyhelminthes

Class Turbellaria

Turbellaria are flatworms that often inhabit freshwater. Most turbellarians are detrivores that feed on dead organic material, or zoophagous, that feed on living or dead invertebrates. This type of flatworm is generally not parasitic.

Additional Common Diptera

Common Diptera

Common Coleoptera

Collembola
Species

Centipede (left; one pair of legs per segment, predatory mouthparts), **Millipede** (right; two pairs of legs per segment)