IN THE GARDEN – N0VEMBER

(0-, 6- legs)

November in Atlantic Canada varies from cool to downright cold. The trees are bare and apart from the odd bird and a few squirrels animal life appears absent. However, there is life at ground level. Have you ever wondered what the birds are finding when they turn over fallen leaves? Maybe it's these little creatures.

In this short discussion I take a look at the legless and 6-legged (non-insect) critters living in the dead and decomposing leaf litter that has accumulated in odd corners of my garden.

Method

There is no practical way to hand search leaf litter but there is a simple 'mechanical' method to do so. A Berlese Funnel is simply a funnel, about 12" top diameter sloping down to about a 1" diameter hole. A wire screen mesh is placed in the funnel to hold the leaf litter and a vial of alcohol (70% or higher) at the bottom collects the critters. A low wattage light bulb above the leaf litter dries out the sample and the animals move down to the lower layers and eventually drop into the vial of alcohol (Fig. 1).

Fig. 1. Funnel with screen mesh (left); with litter sample, alcohol vial, heat/light source (right)

Results

If the litter sample is loosely packed and not excessively wet most of the animals will have left it and dropped into the vial in the 1st 24 hours, but it is worth treating the sample for another 48 hr to retrieve the most resistant (to drying) critters. Contents are then poured into a shallow dish and moved to a vial of clean 70% alcohol with a fine brush. These are some of the animals collected from 3, 72- hr samples from different locations in the garden. A low-power (6-12x) dissecting microscope is necessary to find the smallest critters in the collection vial.

The legless

I was surprised to find 3 tiny white snails (Fig. 2). Slugs, snail relatives, are common during warmer weather but I have never seen a snail (in the garden); maybe they stay in the leaf litter, they do look very delicate. At its widest part the shell measures 0.94 mm.

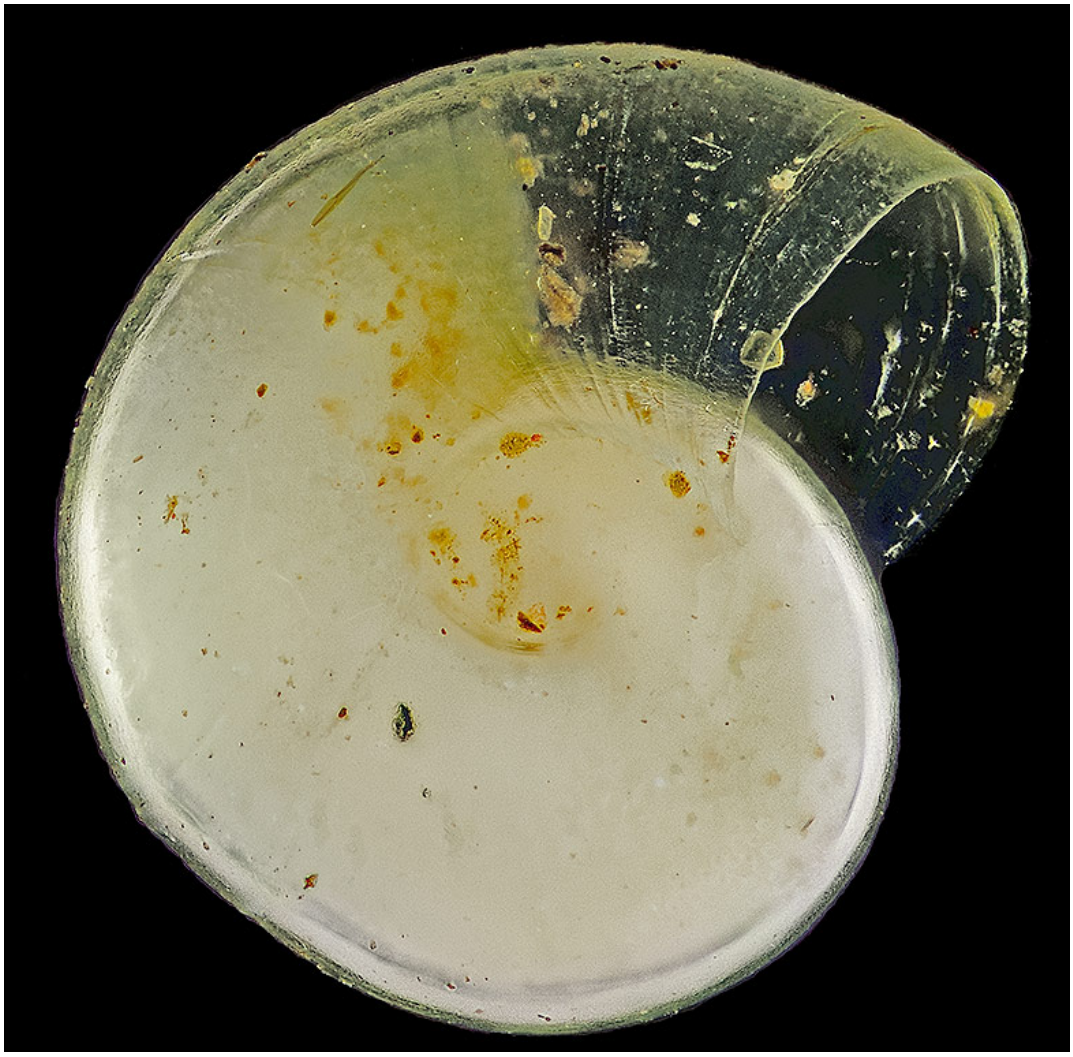

Fig. 2. Tiny delicate snail from leaf litter sample.

Several roundworms (Nematode) were collected. All but one were small, about 3 mm long, and recognized by their shape, no legs, and no head. They were readily separated from the similar sized Midge larvae (Insect: Diptera), these latter having a well-defined head. In addition, the nematode gut seems to be a series of chambers whereas in the midge larva the gut is one continuous tube (Fig. 3).

Fig. 3. Nematode, top, compared with midge (a fly) larva. Note the partitioned gut in the nematode. Midge larva head capsule insert.

There was one much larger nematode; rather featureless except for the gut contents; difficult to measure length but it is 0.2 mm wide (Fig. 4). Under polarized light more structures become visible but apart from the tiny mouth, tiny setae (spines), and a single layer body wall I cannot interpret the rest of the structures; Figure 5 is the anterior end.

Fig. 4. Nematode, anterior end at right. Mouth at top, hardly qualifies as a head.

Fig. 5. Anterior end of the nematode under polarized light.

The 6-legged

Several **Springtails** (Collembola) turned up in the samples. Once thought of as primitive insects they are now in their own rank equivalent to that of the insects, i.e., Class. They are named “Springtails” thanks to a mechanism for their rapid movement – an escape from predators. Towards the back end of the abdomen, on the ventral surface, a pair of appendages have fused to form a furculum (however, some species of Springtails lack a furculum, they are ‘springless’ Springtails!). The furculum is normally folded forward under the abdomen and held in place by a small lock, the retinaculum. The furculum is held in place with considerable potential energy. When released the force propels the little animal up and away to a distance up to 80x their body length. In most of the Collembola collected the furculum had been extended and can be seen as the “tail” at the end of the abdomen in the images. Figure 6 shows two sizes of an Elongate Springtail along with a much smaller Globular Springtail.

Fig. 6. Two Elongate Springtails with furculum (spring) extended, along with a Globular Springtail to show relative sizes.

The fused nature of two abdominal appendages can be seen in the ‘fork’ of the furculum in this dorsal view of an Elongate Springtail (Fig. 7).

Fig. 7. Dorsal view of an Elongate Springtail showing the extended forked furculum at the end of the abdomen.

Other elongate springtails resembling those in Figures 6 & 7, but a different species were in the samples (Fig. 8).

Fig. 8. Elongate Springtails.

Several green Rounded Springtails were found in one sample (Fig. 9).

Fig. 9. Green Rounded Springtail with extended furculum.

While many of the creatures will vacate the litter in 24 hours some are more resistant to the heat and dryness. Three days after setup when I thought the litter was completely dry more species of springtails were found in the collection vial; these two species did look like they had a thicker cuticle than the other species (Fig. 10).

Fig. 10. Four springtails to leave the leaf litter, after 3 days of drying.

I was surprised as to how many species of springtails were in these small samples of leaf litter from what appeared to be identical habitats such as this dark brown species with a dark dorsal segment (Fig. 11).

Fig. 11. Note the retracted furculum.

There were many small white springtails that when magnified showed a mottled grey surface (Fig. 12).

Fig. 12. Small delicate greyish species were common in the samples.

Although not seen in the current samples I had an image of a colourful species from the garden in 2014 (Fig. 13).

Fig. 13. A colourful species from the garden in 2014.

The vast majority of springtails in the samples were elongate but there were a few **Globular Springtails.** These little balls, the smallest barely visible with the naked eye, had faces that in profile reminded me of 'floppy-ear bunnies' (Fig. 14). Figure 15 is a dorsal view of the larger individual in Fig. 14, the same individual as in Fig. 6.

Fig.14. Lateral views of two Globular Springtails; showing unique shape and extended furculae. The floppy ears are the antennae!

In dorsal view they show a round body, short neck, and wide head with relatively large eyes (Fig. 15)

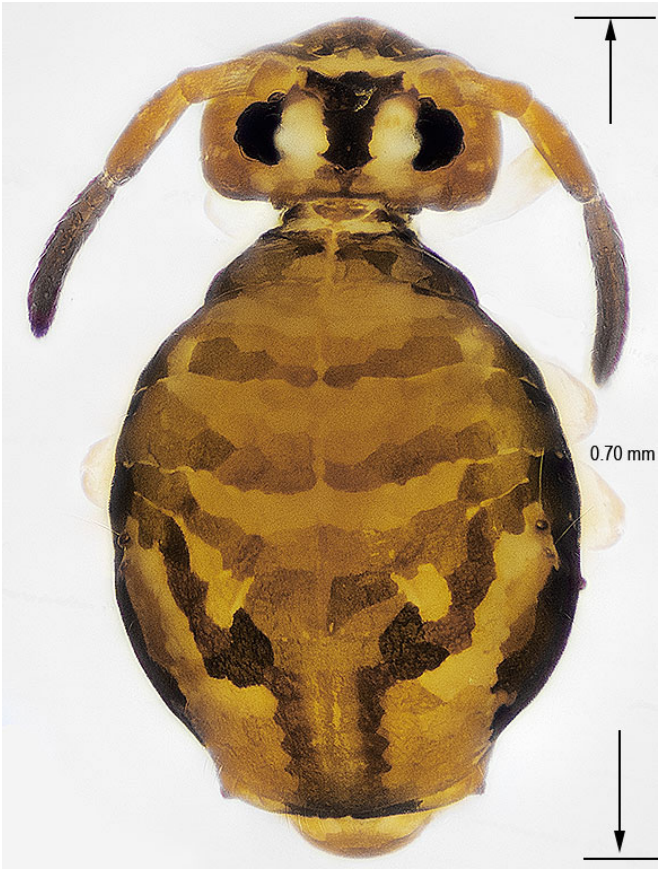

Fig. 15. Dorsal view of a Globular Springtail.

There was one species of globular springtail that had a hairy body (many hairs lost due to handling) Fig. 16).

Fig. 16. Another species of a Globular Springtail, many hairs dorsally but lost in processing!

All springtails have a ventral tube (or “glue-peg” or collophore) on the mid-line of the ventral surface of the 1st abdominal segment. This structure is universal and diagnostic for the Collembola. It is used to anchor the springtail to a surface but its primary function is for absorbing water. Some springtails can extend long vesicles from the ventral tube which can be used to transfer water to the mouth. May also be used to lubricate and clean the legs and mandibles (ref:1). Figure 17 is a ventral view of the left side of the 1st abdominal segment showing the ventral tube (circle 0.20 mm wide) in the center of the segment with its extended vesicle (DIC @ 31.5x).

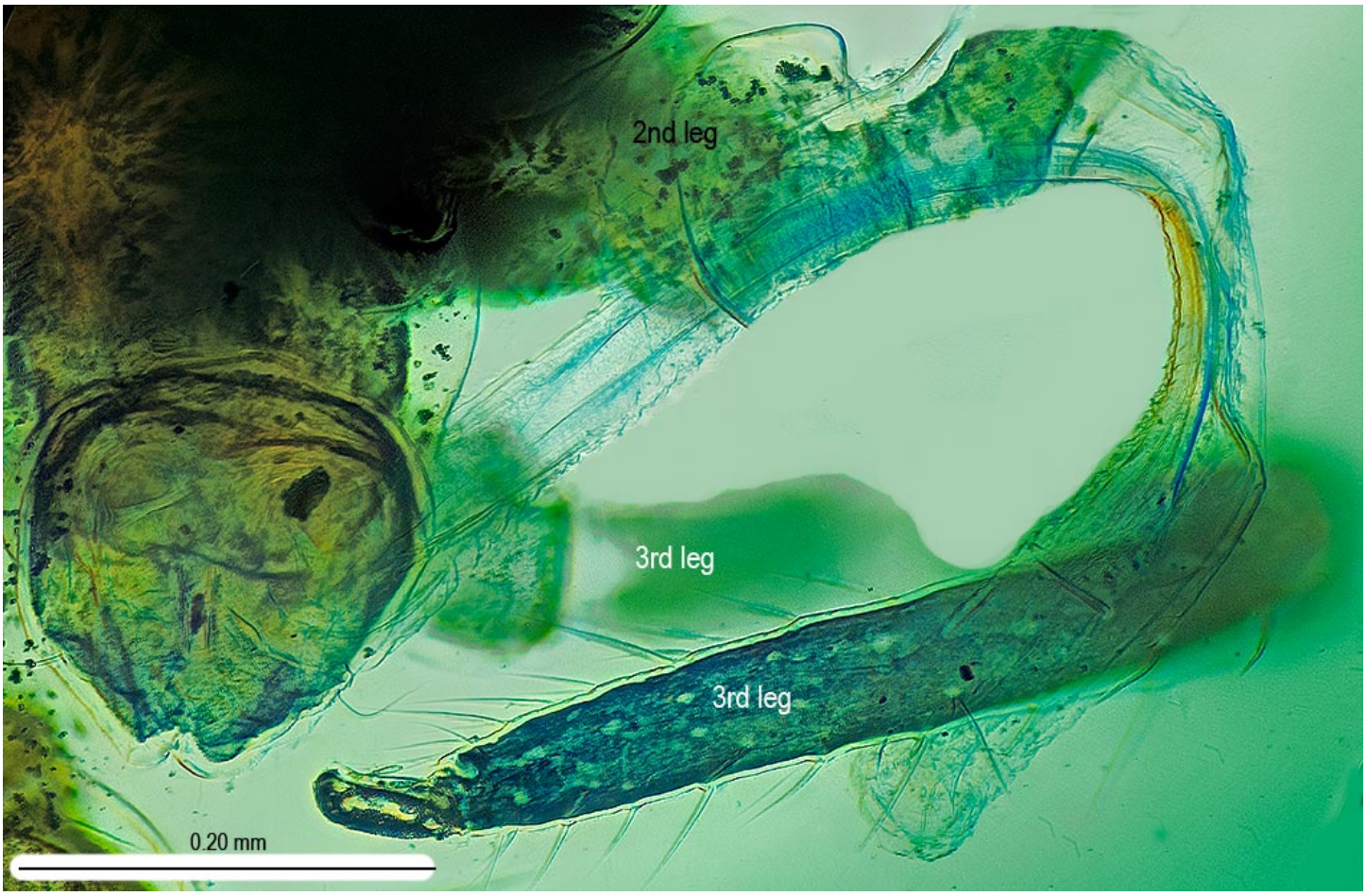

Fig. 17. Ventral view of 1st abdominal segment showing the ventral tube and its vesicle.

All the above springtails with furculae are typical inhabitants of decomposing leaf litter. Other springtails are soil inhabitants; these lack furculae and are ‘springless’ springtails. A few were found in the samples perhaps due to me taking a small amount of surface soil when collecting the leaf litter. The few collected varied in colour from grey to blue (Fig. 18). The blue one may in the Family: Hypogastruridae, Genus *Xenylla*.

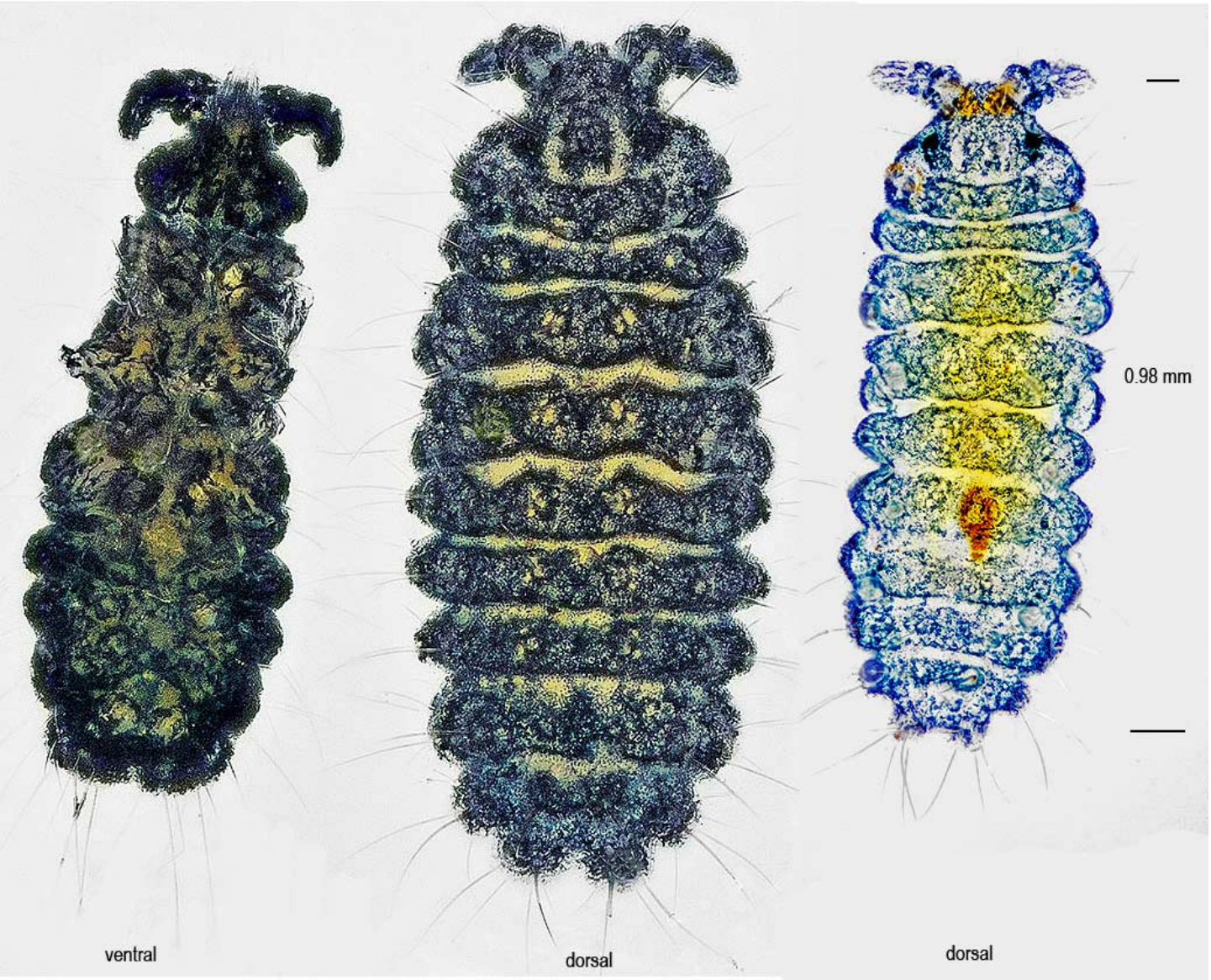

Fig. 18. Soil inhabiting ‘springless’ (lacking furculae) springtails; blue one is possibly *Xenylla* sp.

Summary

Howard Evans (ref: 1) quoted an English study that estimated, in one acre of pasture: 666,300,000 mites; 248,375,000 Springtails; 22,475,000 Centipedes and Milipedes; 131,650.00 other Arthropods.

Ross Arnett (ref: 2) discussing Berlese Funnels “One advantage of this apparatus is that it can be used in the winter, trapping many hibernating species.”

In the 2nd part of this study I will take a look at the other 6-legged critters (i.e., Insects); the 8-legged ones, and the ‘1,000’ – legged ones.

References

1] Evans, H.E. 1979. Life on a Little-Known Planet. 318 pp. Dell Publishing Co.

2] Arnett, R. H. 2000. American Insects: a handbook of the insects of America north of Mexico. 2nd edn. Xvii + 1003 pp. CRC Press.

Anthony Thomas PhD, Entomology

Quote – Holmes on 'Entomology'

"I suppose you are an entomologist ? "

" Not quite so ambitious as that, sir. I should like to put my eyes on the individual entitled to that name.

No man can be truly called an entomologist, sir;

the subject is too vast for any single human intelligence to grasp."

Oliver Wendell Holmes, Sr The Poet at the Breakfast Table.

Comments to the author are welcomed, email – mothman AT nbnet DOT nb DOT ca

Published in the December 2020 issue of *Micscape* magazine.

www.micscape.org