G57 Nematode Community Dynamics Associated With Cadaver (*Sus scrofa* L.) Decomposition and Insect Activity on the Soil Surface

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After attending this presentation, attendees will understand the relationships between the composition of belowground nematode communities and cadaver decomposition as well as how these relationships are influenced by insect activity.

This presentation will impact the forensic community and/or humanity by demonstrating the potential for nematode succession as a basis for estimating postmortem interval.

Soil-dwelling nematodes are microscopic invertebrates that play a key functional role in soil processes of decomposition and nutrient cycling. Nematodes are generally the most abundant and diverse metazoans living in the soil and respond rapidly to disturbance, such as the decomposition of a body. The investigation of nematode community structure can reflect decomposition status because nematodes exhibit a sensitive relationship to their environment by responding to the spatial and temporal dynamics of resources. Thus, a localised succession of nematode trophic groups (bacterial-feeder, fungal-feeder, herbivore, omnivore, and predator) occurs as a resource decomposes. Nematodes are readily sorted into trophic groups because feeding behavior can be deduced from the structure of the mouth cavity and pharynx. This makes nematodes an efficient indicator of decomposition status. In addition, nematodes may be transported to a decomposition site by insects. This may have implications for forensic science because nematodes can establish phoretic relationships with many insects associated with cadaver decomposition (Calliphoridae, Coleoptera, and Silphidae).

This study was based on the understanding that (1) insects respond rapidly to the placement of a cadaver on the soil surface and (2) a proliferation of soil microorganisms is associated with cadaver decomposition in soil. This work aimed to test the hypothesis that nematode community composition is related to the stage of cadaver decomposition and insect activity.

Six 10-week-old pig (*Sus scrofa* L.) cadavers (~45 kg) were killed by trauma (gunshot) to the head and placed inside a 2 m^2 plot on the soil surface within 30 minutes of death. Three cadavers were exposed to insects, three were excluded from insects using Lumite (18 x 14 mesh) exclusion cages (6 ft^3), and controls (plots without cadavers) were used. Thus, four treatments were used: + cadaver + insects, + cadaver – insects, - cadaver + insects, - cadaver – insects. Cadaver decomposition was measured using a decomposition scoring system at intervals of 24 hours for the initial seven days and at intervals of seven days thereafter. Cadaver decomposition was designated as being in one of four stages: Fresh, Early Decomposition, Advanced Decomposition, and Skeletonization. Soil samples (0 cm -10 cm depth) were collected from soil adjacent to the cadavers at intervals of seven days using a soil probe (2.5 cm diameter). Following transportation to the laboratory nematodes were extracted from soils enumerated and identified morphologically. DNA sequencing was used for identification when nematodes could not be identified morphologically.

The exclusion of insects had a significant negative effect on cadaver decomposition. Cadavers exposed to insect activity reached Early Decomposition by day 2, Advanced Decomposition by day 4 and Skeletonization by day 21. In contrast, cadavers excluded from insect activity reached early decomposition by day 3, Advanced Decomposition by day 21 and had not reached Skeletonization by day 49. Insect activity also had an effect on belowground nematode abundance that was characterized in a delay in peak nematode abundance. In the presence of insects nematode abundance reached peak levels on day 14. Nematode abundance in the absence of insects reached peak levels on day 21 to day 28 and a second peak was observed on day 49. The nematode community in association with insect activity could be dominated by phoretic nematodes while the nematode community in exclusion cages could be dominated by native soil-dwelling species. Nematode species identification is currently underway and results will be presented.

Taphonomy, Nematode, Succession

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