

Pierce Cedar Creek hosts Tick and Lyme Disease Researchers

Pierce Cedar Creek Institute collaborated with researchers from Calvin University (CU) and Michigan State University (MSU) on assessing the impact wildlife has on the movement of disease-carrying ticks in West Michigan. In September, the Institute hosted Will Miller (CU Assistant Professor of Biology) and Jean Tsao (MSU Associate Professor, Dept of Fisheries & Wildlife and Large Animal Clinical Sciences) and forth-year MSU Veterinary students Samantha Kaplan and Ashley Hetak.



Tick and Lyme disease Research team. From left, Professors Will Miller and Jean Tsao, students Samantha Kaplan and Ashley Hetak

The fall study involved capturing small mammals and gently removing ticks from their fur and ears. After removing the ticks, the researchers released the mammals back to their nesting sites. The collected ticks were sent to a lab to be tested for the presence of Lyme disease.

The small mammal survey was an extension of a tick drag sampling study carried out at the Institute earlier in the summer. Drag sampling helps determine tick abundance in their natural habitat, where they live while not attached to a host for feeding. Ticks are often found along forest edges and tall grass areas. The Institute funded the initial drag sampling project to help explore the link between human health and the health of animals and ecological systems. This type of research capitalizes on the One Health Paradigm that seeks to combat the growing threat from carrier-borne disease by understanding its relationship to population growth, trade, and climate change. The Institute awarded an Environmental Research Grant to Calvin University to conduct the drag sampling study and offer a unique educational opportunity for students. Under the guidance of Professor Miller, CU students Abigale Liebetreu and Andre Kapteyn conducted the drag sampling throughout the Institute's 850 acres.

Before the small mammal fieldwork began, Professor Miller utilized one of the Institute's laboratories to help train the students on the project objectives. The field research team was led by Jean Tsao. In addition to her work with MSU's Dept. of Fisheries & Wildlife, Professor Tsao also teaches at MSU's College of Veterinary Medicine. Professor Tsao teaches courses in medical entomology and field ecology and has conducted extensive research on *Borrelia burgdorferi* (*B burgdorferi*), the bacterium that causes Lyme disease, and its carrier, the blacklegged tick.

In addition to *B burgdorferi*, ticks can carry several other diseases that can infect humans and companion animals. Veterinary students Kaplan and Hetak assisted Professor Tsao to gain experience with conducting ecological field research and handling small mammals.



Students Samantha Kaplan (left) and Ashley Hetak examine a white-footed mouse for the presence of ticks.

The U.S. Center for Disease Control (CDC) reports that Lyme disease is the “most common vector-borne disease in the U.S.” A “vector” is some type of carrier that can transfer an infective agent from one host to another. In the case of Lyme disease, the vector responsible for most infections in the Northeastern U.S. is the blacklegged tick (*Ixodes scapularis*), also known as the deer tick. In its early stages, Lyme disease can cause flu-like symptoms, but if left untreated, the disease can spread into the heart, joints and the nervous system.

Interestingly, ticks aren’t normally born as carriers of Lyme disease, they acquire it when feeding on other animals who harbor *B burgdorferi*. In the Great Lakes region, ticks feed on a variety of small and large mammals. Studies indicate that the white-footed mouse (*Peromyscus leucopus*), is a primary reservoir for transmitting *B burgdorferi* to ticks. In the study of disease transmission, a “reservoir” typically refers to an organism, like the white-footed mouse, that harbors and transmits an infectious agent without succumbing to the disease itself.

The CDC estimates that between 2010 and 2018 there were approximately 476,000 people diagnosed with and treated for Lyme disease each year in the United States. Understanding the extent to which ticks are feeding on small mammals and how many ticks are infected with Lyme disease were key research objectives of the project. By assessing the prevalence of Lyme disease at the Institute, this research contributes to our knowledge about tick-borne disease in Michigan.

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