



Speaker:

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Date: Monday, October 24, 2022

Time: 4:00 pm - 4:50 pm

Format: In-Person Seminar & Virtual Access

Location: Genomics Auditorium 1102A

Zoom: 938 1040 4405

Passcode: 833289

Title:

“Forces to pierce cuticle of tarsi and material properties determined by nanoindentation: The Achilles’ heel of bed bugs”

Abstract:

Bed bug (*Cimex lectularius* L.) infestations are an increasing global problem. The prominence of the global issue persists because bed bugs have evolved resistance to many chemical pesticides. This issue facilitates the necessity for non-chemical, physical methods to be incorporated for bed bug integrative pest management (IPM). To inform the development of these physical methods of IPM for bed bugs, the mechanical properties of bed bug tarsi and pretarsi were investigated. We evaluated the vulnerability of bed bug tarsi to piercing by plant trichomes. Nanoindentation was used to measure the force required to insert a sharp probe into the cuticle of these different regions, as well as to determine other material and mechanical properties for the cuticle. We found 1) a greater force was required to insert this sharp probe at greater depth or at faster strain rates, and 2) a specific region of the pretarsus (membrane with microtrichia) more frequently pierced by trichomes during bed bug locomotion required approximately 20-30% less force, and had a lower reduced elastic modulus for the first micron of indentation compared to the other regions of cuticle. These mechanical attributes of cuticle, which will facilitate the initial stage of puncture in addition to the presence of natural infoldings in the cuticle of this area, may make that area of the pretarsus particularly vulnerable to piercing.

Refreshments will be served in the Entomology Building Courtyard at 3:30pm