

Whole tissue histology and microscopy techniques for rapid electropenetrography feeding site correlations in plant or animal tissues

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Despite the power and precision of electropenetrography (EPG) to explore the probing behavior of piercing arthropods, some aspects of this technology remain slow and tedious. One such aspect is the correlation of EPG waveforms to specific probing behaviors within host tissues. This correlation step is crucial to building an understanding of the biological meaning behind the EPG waveforms generated, especially when investigating the probing behavior of newly recorded arthropods. Historically, researchers have used microtomy or ultra-microtomy to section host tissues in search of the feeding traces and resulting tissue damage. While these techniques yield highly detailed results, they are also time-consuming and require a significant level of expertise. I will discuss methods for the histological processing and microscopic visualization of tissues, including histological techniques to clear tissues for staining and light microscopy, whole mount tissue laser-scanning confocal microscopy, and x-ray analysis and visualization of excised tissues. Considerations of methodological complexity, necessary levels of expertise, access to equipment, and techniques suitable to experimental tissue type (animal vs. plant, soft vs. tough, etc...) will be summarized.