Advancements in AC-DC electropenetrography accelerate application of EPG to all-new arthropod pests and research questions

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It was once very challenging to study the detailed stylet probing behaviors of piercing-sucking arthropods, especially vectors of pathogens (infecting either plants or animals). Their piercing mouthparts probe opaque host tissues, preventing direct, visual observation. The invention of electropenetrography (EPG) overcame this challenge over 60 years ago. Since the beginning, EPG has been used to study plant-pathogen transmission, primarily by tiny, plant-feeding vectors like aphids, psyllids, and whiteflies. The 3rd-generation, AC-DC electropenetrograph was designed to enlarge application of EPG, with flexible settings to optimize detection of a wider variety of types of probing, sizes of arthropods, and types of host plants or animals when compared to previous instrument designs. These advances in EPG technology have opened new avenues to study large hemipterans like true bugs, large planthoppers, and sharpshooters, as well as all-new work with blood-feeders like mosquitoes and ticks, and new behaviors like oviposition. Opportunities now exist to study effects of many pest management tactics, such as chemical compounds and host resistance, on blood feeding underlying animal-pathogen transmission. The purpose of this talk is to launch presentations at the EPG Conference by reviewing basic principles of EPG Science and describing very new information, protocols, and software to accelerate application of EPG to previously unstudied systems and research questions. These new methods will widen the research applications for EPG and help both experienced and novice EPG users to innovate pest management solutions to new and/or invasive arthropod pests.