

## Waveforms from *Culicoides sonorensis* biting midges probing on human hands

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*Culicoides sonorensis* Wirt & Jones biting midges (Diptera: Ceratopogonidae) transmit arboviruses that impact ruminant livestock operations in North America. Unfortunately, little is known about these insects' probing and ingestion behaviors inside host tissues, even though these behaviors may directly affect pathogen acquisition and inoculation. We used AC-DC electropenetrography (EPG) to characterize waveforms generated by *C. sonorensis* probing on human hands. In addition, we used insect dissections and video recordings to correlate behaviors with waveforms. The optimal settings for EPG recordings of *C. sonorensis* were an Ri level of  $10^8$  Ohms using an applied signal of 75 millivolts direct current. Waveforms generated by *C. sonorensis* differed in appearance from waveforms generated by *Aedes* and *Culex* mosquitoes feeding on human hands but contained the same six waveform families and many of the same types, including waveform family J (surface salivation on the host), K (stylet penetration of the skin), L (types 1, 2, 3, 4, and 5, preparation of an ingestion site), M (types 1, 2, 3, 4 and 5, ingestion), N (types 1, and 2, unknown), and W (stylet withdraw from the host). Types L5 and M5 have not been observed in mosquitoes. This investigation provides novel insight into the probing and ingestion behaviors of biting midges and telmophagous insects. This information will enable future EPG studies aimed at understanding how factors such as pathogens, pesticides, and genetic modifications impact probing behaviors and pathogen transmission, which may facilitate the development of new targets and strategies for pest management.