NOISE AND SIGNAL TRANSMISSION PROPERTIES AS AGENTS OF SELECTION IN THE VIBRATIONAL COMMUNICATION ENVIRONMENT

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ABSTRACT

Members of the *Enchenopa binotata* species complex (Hemiptera: Membracidae) are host-specific phytophagous insects that communicate by sending vibrations through their host plants. Successful communication depends on the prevailing ecological and environmental conditions, which can affect communication behavior and the evolution of signals and sensory structures. Here I address how male and female *E. binotata* behaviorally respond to noise, and whether variation in plant transmission properties can promote divergent selection on vibrational mating signals. When presented with vibrational noise derived from wind males and females reduce their signaling behavior. However, individuals use strategies such as gap detection, which allow communication to persist during low levels of noise. The evolution of signals is strongly affected by how signals transmit through plant stems and leaves. Using a novel method to measure plant stem vibrations I also illustrate differences in plant transmission properties between the host plants of two closely related *E. binotata* species. Each *E. binotata* species appears to have responded to these transmission differences: both insect species use a signal frequency that transmits well in their contrasting communication environments, which suggests further that shifting to new host plants may favor signal divergence and ultimately, behavioral isolation.