Are social integration signals slowly evolving and widely shared in treehoppers?

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Introduction

- Social signals evolve more slowly than mating signals
  - For example, mammalian infant cries sound similar across species, and some mammalian mothers respond to the cries of infants from other species
- Treehoppers are sap-feeding, group-living insects that use vibrational social signals to locate other group members
- *Tylopelta gibbera* nymphs produce a "purring" signal while walking and occasionally pause; during this pause, settled individuals produce "ticks" in response to this signal
- Nymphs of other treehopper species also produce "ticks"
- **Hypothesis:** Treehoppers' "tick" signals are part of a widely shared, slowly evolving social integration system
  - **Prediction 1:** Settled individuals produce "ticks" when there's a searching individual present
  - **Prediction 2:** Searching treehopper nymphs will respond to "ticks" from other species

Methods

- Testing prediction 1:We analyzed an archive of treehopper signals, recorded by one of the authors, to compare the signals of closely related species (Figure 1).We then compared timing between walking and "ticks"

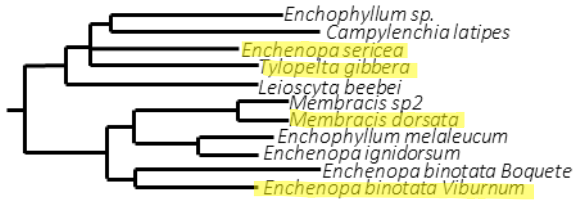

Figure 1: Preliminary phylogeny of treehoppers used for analysis. Nymphs of the species shown produces "ticks". Highlighted species indicates spectrograms in Figure 2 (From Cocroft, Lin, and Michael in prep)

Results

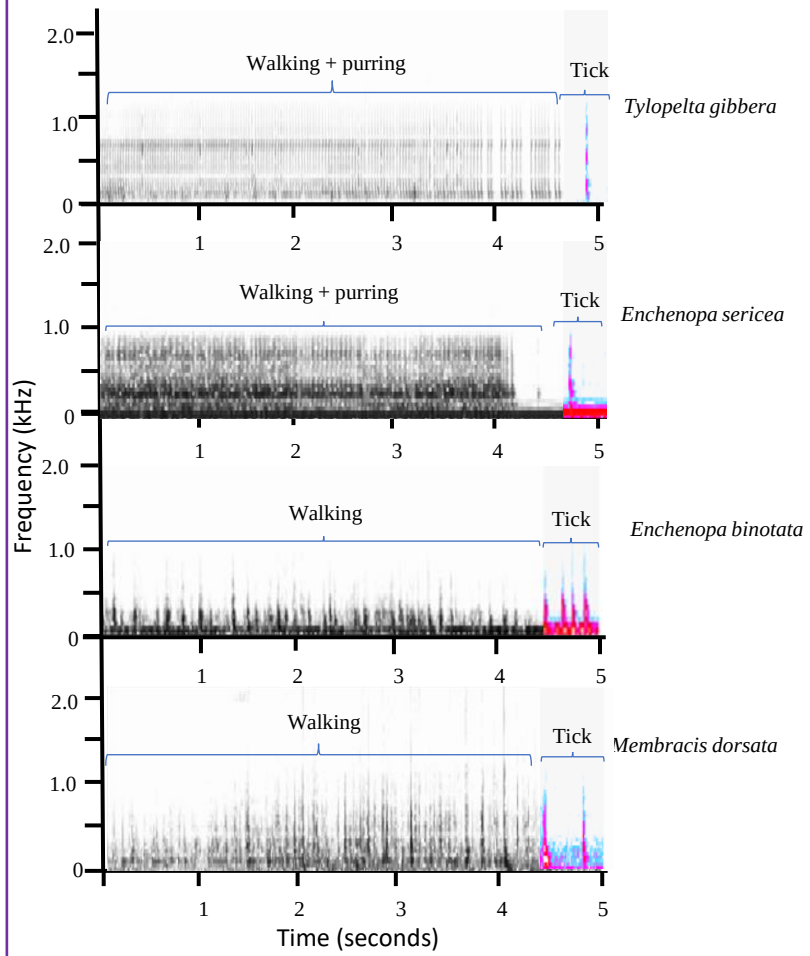

Figure 2: Spectrograms of vibrations produced by walking individuals and "ticks" produced by stationary individuals in various treehopper species

Discussion & Future Work

- Prediction 1 is met in the species studied
  - The signals depicted in figure 2 all have the same pattern of intermittent walking followed by ticks
- Walking vibrations alone seem to trigger the production of ticks, even in the absence of purring signals
- The next steps are:
  - To test prediction #1 quantitatively by comparing the timing and acoustic features of the "ticks" in more species
  - To test prediction #2 by running playback trials to see if ticks have the same function in different species (such as *E. binotata,* Figure 3)

Figure 3: *Enchenopa binotata* nymphs

Acknowledgements & References

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