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Multimodel Courtship Signaling in The Family Hylidae

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Multimodal Courtship Signaling in the Family *Hylidae*



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Multimodal Courtship

It is becoming increasingly obvious that species' courtship is a lot more **complex** than originally thought. Hundreds of studies have described varying courtship systems focusing on a **single trait**, but we know many species have **multiple** secondary courtship signaling methods (Hebets, 2005).

Multimodal courtship systems describe a composition of signals covering many different senses. Many displays use at least two signals of different senses, such as the bright color and auditory calls (Mitoyen, 2019). **Is having multiple courtship methods better than just one?**

Prediction

- Aim 1: How many Hylid species use multimodal/unimodal courtship signaling?

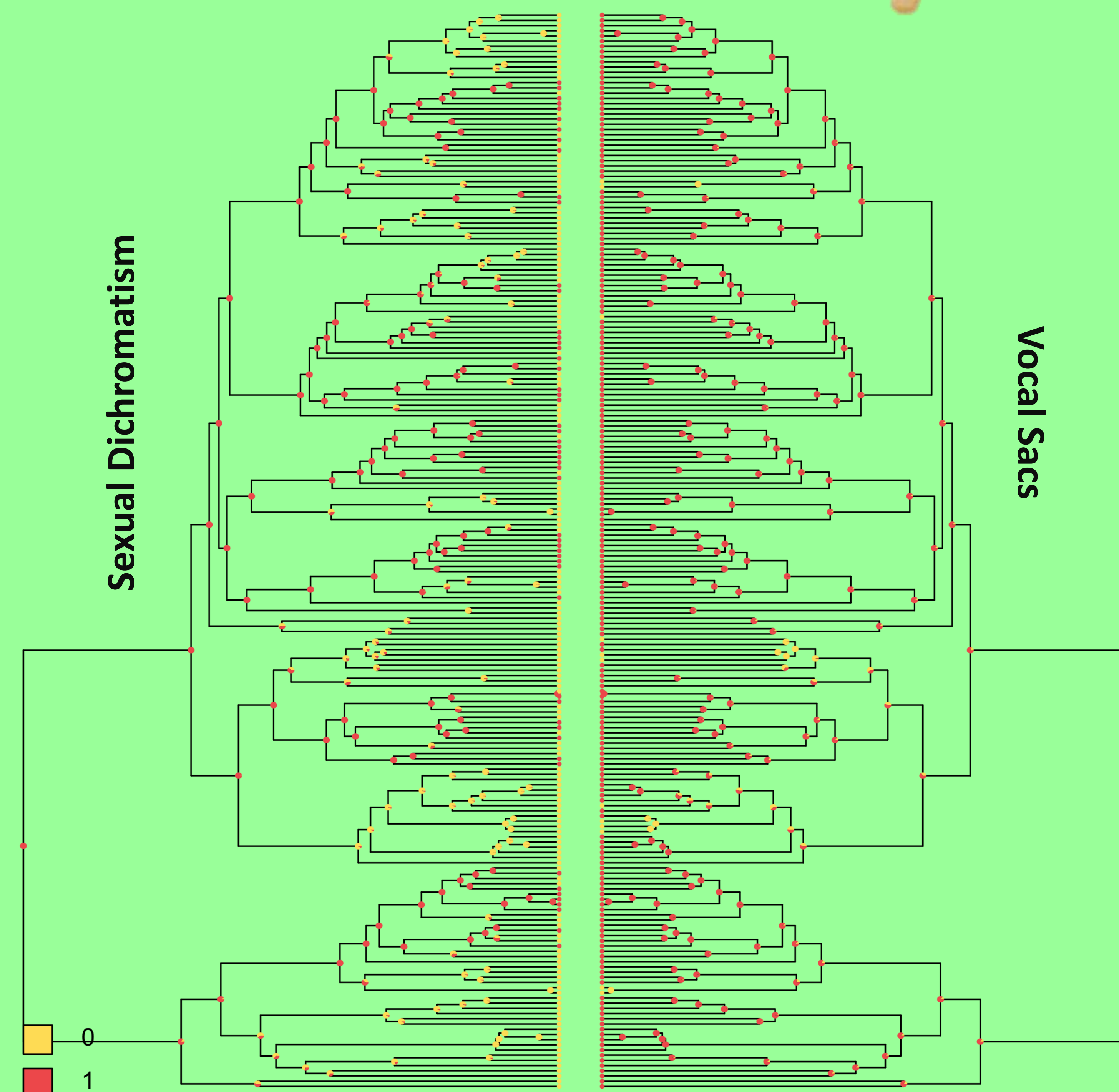
- Aim 2: How many times have each evolved? Is unimodal courtship likely to evolve into multimodal?

- Prediction: Multimodal signaling will be the most common. Because vocal sacs are the ancestral trait, it will be more likely that sexual dichromatism (dichrom) will evolve as a secondary courtship signaling method.

Multimodal courtship signaling may **not** be as advantageous as we thought.



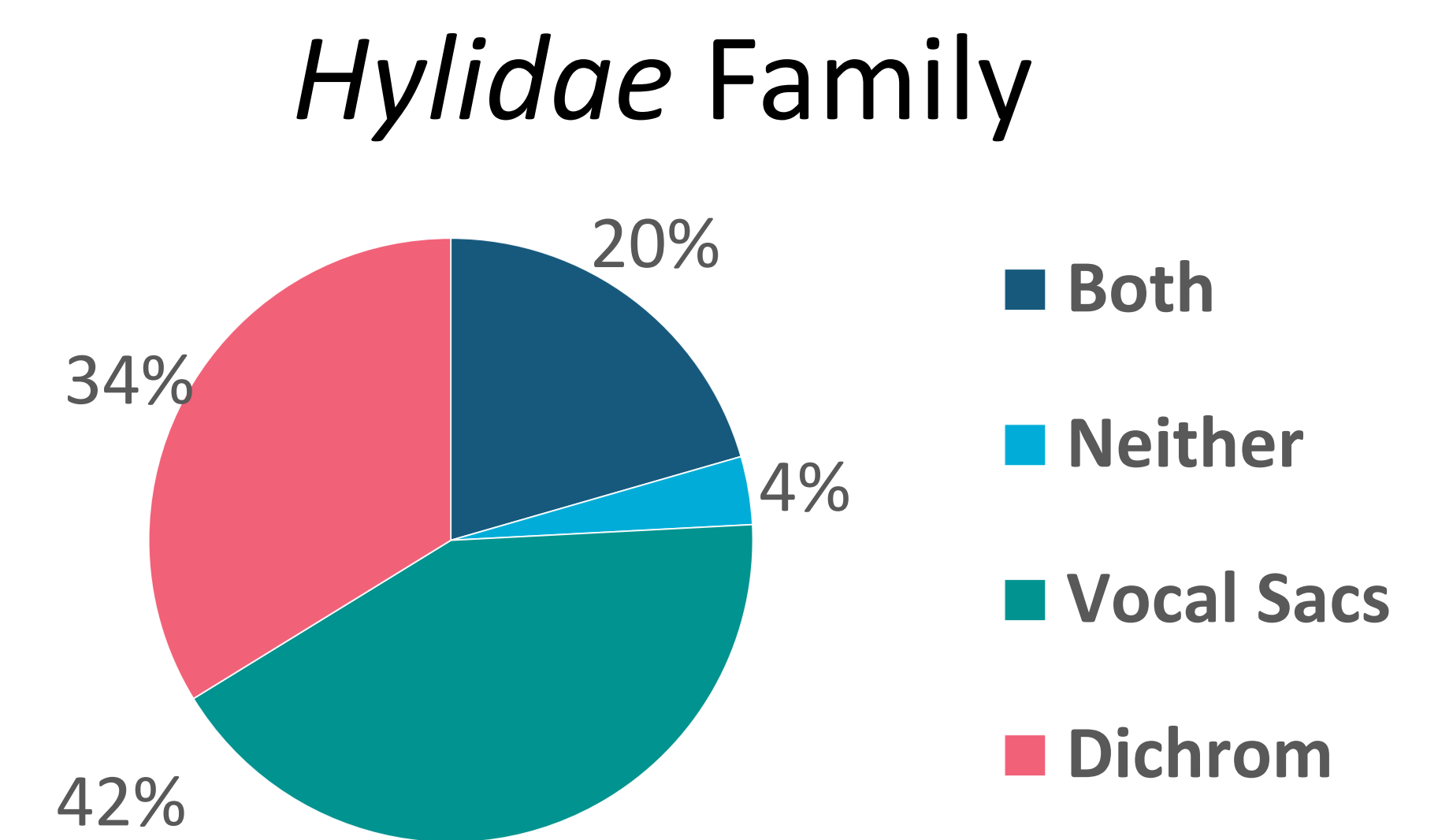
Japanese Tree Frog (*Hyla japonica*)
-Signaling Methods: Vocal Sacs only



The evolution of vocal sacs and sexual dichromatism in the family Hylidae

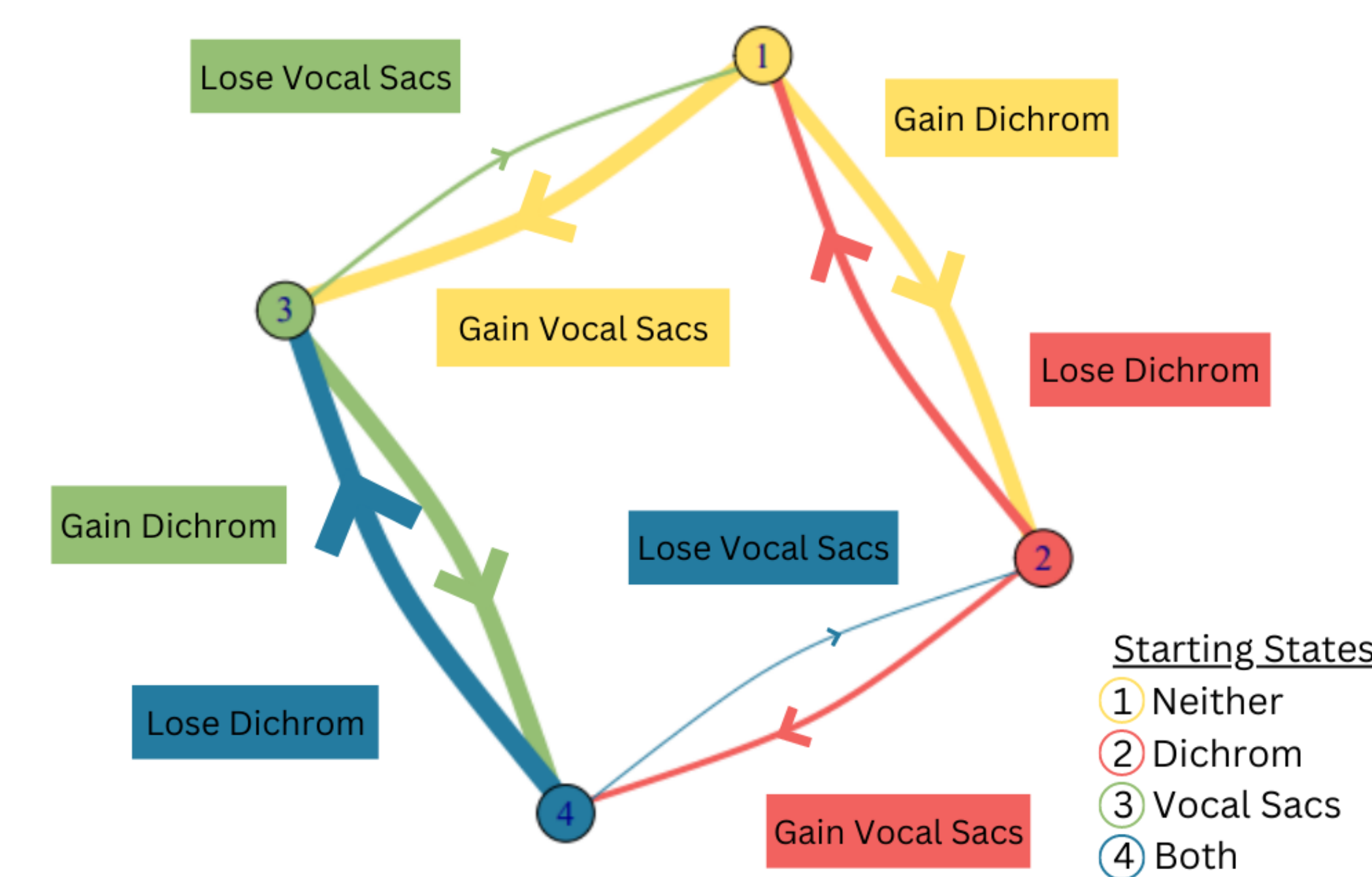
Trait Reconstruction

- Peer-reviewed data for 203 Hylid species
- Ancestral trait reconstruction/phylogeny using Rstudio
- Trait correlation tests via Pagel's Methods



Methods of courtship signaling in the family Hylidae

BayesTraits Transition Rates



Calculated likelihoods of evolving a signaling method

Results and Considerations

- Most Hylids only use vocal sacs
- Highest transition rate favored **unimodal** courtship displays (**losing** a signaling method)
- Possible other methods including call variation, touching, movement (Hartmann, 2004)
- Multimodal signaling too costly evolutionary (Visibility to predators?)

References



College of Science
UtahStateUniversity

