**EEOB 563 Final Project Outline**

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**Background:** *Leptoloma* Chase is a genus of grasses comprising five species, all of which are endemic to North America. An overview of these species can be seen in Table 1. *Leptoloma* is often treated as an infrageneric taxon within the genus *Digitaria* Haller and is distinguished morphologically from other closely related clades by having an open paniculate inflorescence, with spikelets usually being solitary on elongated pedicels. A morphological phylogeny from 2009 placed species from *Leptoloma* sister to species from *Digitaria* sect. *Pennatae* (Stapf) Henrard in the ‘Tumbleweed’ clade. The name of this clade is due to the nature of most species in this group having an inflorescence that dehisces and forms a tumbleweed at maturity. This trait, however, is also seen in other species of *Digitaria* outside this clade. To date, no molecular phylogeny performed on this group has included any *Leptoloma* species other than *L. cognatum*, leaving the taxonomic status of this clade unclear.

**Table 1.** List of species in *Leptoloma*, their geographic range, and diagnostic characters within the genus.

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| **Species** | **Geographic Range** | **Diagnostic characters** |
| *Leptoloma arenicola* Swallen | Gulf Coast, Texas into N. Mexico | Spikelets 3.5–4.6 mm, solitary; upper glume 5-7 veined; rhizomatous |
| *L. clarkiae* (Sánchez-Ken) Wipff & Shaw | Central Mexico | Spikelets 2.7-3.2 mm long, paired; upper glume 3-veined; lower lemma 7-veined; without rhizomes |
| *L. cognatum* (Schult.) Chase | Eastern U.S., as far west as Texas | Spikelets 2.2-3.3 mm, solitary; upper glume 3(-5)-veined; lower lemma 7-veined; without rhizomes |
| *L. pubiflorum* (Vasey) Wipff & Shaw | Southern Oklahoma, Texas, west to Arizona and south into N. Mexico | Spikelets 2.2-3.3 mm, solitary; upper glume 3(-5) veined; lower lemma 5-veined, densely pubescent; without rhizomes |
| *L. syrticola* Wipff & Shaw | Texas and S.E. New Mexico | Spikelets 2.2-3.3 mm, solitary; upper glume 3(-5) veined; lower lemma 5-veined, densely pubescent; rhizomatous |

**Objectives:** The objective of this project is to begin to provide evidence for whether or not *Leptoloma* is monophyletic by constructing a phylogeny with molecular data. Additionally, multiple methods of phylogenetic inference will be compared to see how the results of each differ.

**Methods:** This project will utilize widely available sequence data for a variety of species from *Digitaria* and *Leptoloma* that can be downloaded from NIH Genbank (<https://www.ncbi.nlm.nih.gov/genbank/>). A large number of datasets currently exist for whole genomes and individual genes that have been sequenced from species in *Digitaria.* The only *Leptoloma* species for which open-source sequences are available is *Leptoloma cognatum*. However, I am currently in the process of attempting to obtain sequence data for the other four species of *Leptoloma*. If obtained, these sequences will be included in the analysis.

First, sequence alignment will be performed using the program MAFFT. Next, the phylogenetic trees will be estimated using neighbor-joining methods, maximum likelihood, and Bayesian approaches using the programs PHYLIP, RAxML-NG, and MrBayes in that order. Bootstrap scores will also be calculated and trees will be visualized in FigTree.