Tree Thinking Short Paper

BIOL6304: Principles and Practice of Phylogenetics
Caminalcules or Dendrogrammaceae Assignment

September 5, 2022

1 Learning Objectives

After completing this activity, students will be able to:

1. Construct a character matrix of morphological characters.
2. Infer a phylogeny using maximum parsimony.
3. Interpret phylogenies using the principles of tree thinking.
4. Write a systematics report based on a phylogenetic inference.

2 Introduction

Over the last two weeks, you have been working with the Caminalcules or Dendrogrammaceae, and should have generated:

- A matrix of morphological characters.
- A phylogeny inferred using maximum parsimony.
- Reconstructed character states for one or more characters.

In this assignment, you are tasked with writing a systematics report of the Caminalcules or Dendrogrammaceae based on these data. The purpose of the assignment is for students to demonstrate an understanding of tree thinking and the You will also perform a phylogenetic comparison between two methods of inferring phylogenies. Exactly what you decide to compare is up to you.

Note that if the phylogeny you inferred with your character matrix is completely unresolved, it will not be appropriate for this paper. You may add to or replace characters as needed, but a somewhat resolved phylogeny is required for the paper.

3 What to turn in

The full paper should be 3-5 pages long (not including figures/tables). You should also turn in one or more NEXUS file(s) containing your character matrix and your phylogenetic trees.

Please turn in all of these files on Blackboard by **Midnight on September 29, 2022**.

4 Sections of the Short Paper

Introduction

Introduce the Caminalcules or Dendrogrammaceae and the rationale behind the study. Perhaps you are interested in the evolution of a particular character, or you have chosen to compare two weighting schemes. Explain in the text what your comparison might mean for the evolution of the Caminalcules or Dendrogrammaceae: what do you expect to find?

Materials and Methods

Fully explain your choice of characters and character states for the Caminalcules or Dendrogrammaceae (a table may be appropriate). In a few paragraphs, explain your procedure for inferring the phylogenetic tree of the Caminalcules or Dendrogrammaceae. Which programs did you use? What parameter settings did you choose, and why? How are you evaluating support for your phylogeny? The goal with any methods section is for someone to take your NEXUS file and instructions and completely recreate your study.

You must choose some kind of comparison to do within your paper, which can focus on either phylogenetic methods or the character matrix itself. Describe the comparison you are making and all of the instructions needed to repeat the comparison. The goal of the Comparison portion is to test how you evaluate similar trees using tree thinking terminology.

Results and Discussion

Present the results of the phylogenetic inference as both a figure and in the text. Using the tree terminology and tree-thinking methods we have discussed in class, describe the evolution of the Caminalcules or Dendrogrammaceae. How are the groups related, and what does that mean for character evolution? Present the results of your character state evolution analysis, using the terminology you learned in class.

This section should also include at least one figure. This will likely be your phylogenetic tree, but the design of the figure is up to you. For example, it may be a cladogram or phylogram, and may include reconstructed character states.

Works Cited

Be sure to cite all programs used in your analysis. You should also cite the original Caminalcules or Dendrogrammaceae papers. Additional citations should be added as appropriate. Any citation style will be fine as long as it is consistent throughout the paper.

5 Grading Rubric

10% : Explanation of methods
10% : Explanation of an appropriate comparison
5% : Clarity of writing
30% : Use of “tree thinking” language
20% : Accurate interpretation of phylogeny
20% : Accurate interpretation of character evolution

5% : Works cited and in-text citations