Teaching Notes

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**Course Information**

Department: Biology

Level: **Upper Undergraduate**

Course type: **Lab and Lecture**

Students: **Majors**

Number of Students: 16

**Module Information**

Original Module Name: Morphological and Molecular Phylogeny

Link to Original: https://qubeshub.org/qubesresources/publications/426/1

**Teaching Notes**

*(Think about what you would like to read about this activity if you came back to it in 2 years)*

Suggestions for this section (not all required, and extras always welcome):

* **What did you change and why?** Instead of testing our morphological data with Mesquite’s molecular tools, we used literature, as I was not able to get ClustalW installed in the lab computer on time. I found these two papers good: <http://www.pnas.org/content/pnas/115/10/E2274.full.pdf> and <https://doi.org/10.1016/j.pbi.2012.10.001>
* How did the activity go?
  + **What went well and why?**
    - Students were instructed to “Go out in nature and find members of the major plant divisions”. (I assigned each group a different clade). They enjoyed this, and came back with beautiful pictures from their hikes, and appropriate plant material. One even brought back algae, but no one could find Chara. (Outgroup)
    - They enjoyed building their character matrices and phylogenetic trees in the Mesquite software, I had them include pictures to the tips using the annotations panel. They looked really nice and more professional than the sketches they made on the handout.
  + **What went wrong and why?**
    - They weren’t able to include a molecular “test”, because they did not have ClustalW software, and I didn’t realize that was necessary to run the alignment in Mesquite. I have now figured out more about how to do this, and I’m excited to do this more thoroughly next semester. However, I am using the rbcL gene, and perhaps someone in this group has a better suggestion. It would be really great to use a nuclear gene (perhaps 18S rRNA) as well as a plastid gene to compare trees from both to the character based tree.
* What was the prep like?
  + **How much time went into prep?**
    - Way too much! I am trying to prepare a pdf with clear instructions on how to use Mesquite more efficiently, and next time I will have the students download ClustalW
  + **Did you have to do any prep (i.e. grow cultures, grow seeds, order supplies) ahead of implementation?**
    - Not really, because I had the students collect the plant materials for the morphology activity. I may order Chara from a biological supply company next time.
* **Would you do this activity again?**
  + - Absolutely! I hope to improve it through time.
  + **What would you change in the future?**
    - I would have the students read the literature first, and maybe I will try to help them make a bigger phylogeny. I would make it a three part, instead of 2-part lab, and I would include include microscopy of vasculature as an additional trait.
* **What do you wish you’d known before you ran the activity?**
  + That I had to download ClustalW to make the alignments function, and some tips about using Mesquite and importing genetic data.
* Is there anything else you would like to make note of?
  + I also made a nice lab practical question where they had to organize living plants into the proper places on the phylogeny.