**Inquiry-based hypothesis testing using phylogenetic trees in MEGA**

## Teaching Notes

### By **Kristin Hultgren**

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**Course Information**

Department: **Biology**

Level: Lower**/Upper Undergraduate** (select one)

Course type: Lab/Lecture**/Both** (other, please describe) (select one)

Students: **Majors/**Non-majors (select one)

Number of Students: 19

**Module Information**

Original Module Name:

* EXERCISE 4.1: Inquiry-Based Investigation – Evolution of Alcohol Metabolism
* EXERCISE 4.2: Inquiry-Based Investigation – Tracking a Virus
* EXERCISE 4.3: Inquiry-Based Investigation – Identification of Pathogenic Species in Horse Corneal Ulcers

Link to Original:

[Adapted Module Name: (if applicable) N/A

Link to Adapted Module]

Modified Module Names:

* QUBES4-1\_Primate\_ADH4.docx
* QUBES4-2\_Zika.docx
* QUBES4-3\_Horse-pathogen.docx

Files associated:

-For each module, an introduction, a student postlab worksheet, and necessary FASTA sequences are bundled into a single document along with a preface page with implementation instructions for the instructor.

**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):

* **Scaffolding**: Students should prepare for this activity by learning MEGA and Genbank in previous labs (sequence alignment, getting sequences from Genbank, BLAST, and basic tree-building). In class, prior discussion of reading and interpreting trees (tree-thinking) is important.
* **What I changed:** For activities 4.1-4.2, I clarified the hypotheses, and added a few questions where students had to make specific hypotheses about what their tree would look like under each specific hypothesis.
* **For activity 4.3**, I simplified the activity somewhat to make use of tools that students had already learned (e.g., BLAST)
* **Implementation March 2021:** The activity went well. Students were generally very well-prepared and had few questions about doing the activity. Most students chose the activity on alcohol metabolism.
* Preparation and scaffolding was already built into the class. It did not take long to upload the modified activities into Canvas.
* **Changes for the future:** I think this activity, especially part 4.1, could be modified to fit as part of a lab for a genomic lecture, especially in the context of discussing gene trees vs. species trees. The Zika problem could be used as a homework or lab assignment with the phylogenies lecture. I would definitely use these activities again.