

# If the shoe fits: A relatable approach to teaching tree-thinking in an introductory biology lab

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First-year students often lack the phylogenetic literacy required to understand and correctly interpret phylogenetic trees. We designed a suite of interactive exercises to provide students with opportunities to practice tree-thinking and construct phylogenetic trees using familiar “species”: shoes. All exercises were designed to fill a single 3-hour laboratory period, but individual components could be used as stand-alone activities in labs or lectures. Throughout the laboratory period, students reviewed key terms and concepts using generic phylogenetic trees. Students were then introduced to phylogenetic trees made up of non-biological specimens to focus on the structure of phylogenetic trees and establish a foundation for tree-thinking. Finally, students were given hypothetical, “species” of footwear and tasked with creating and defending a phylogenetic tree. Workshop participants will have a chance to engage with tree-thinking using non-biological specimens that can be manipulated in the hands-on construction of phylogenetic trees. Using this approach in our first-year labs helped to foster students' understanding of phylogenetic trees and realization that trees are merely hypotheses of relationships based on current knowledge. Throughout the workshop, we will discuss and highlight common student misconceptions or points of struggle we have observed after our two implementations of these activities in a large enrolment (>1,000 student) majors introductory biology lab. We assessed students' phylogenetic tree interpretation pre and post lab, and found a 22% increase in overall student performance, using anonymous iClicker questions.

**Keywords:** Tree thinking, introductory biology, phylogeny

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